Electronic MUSICIAN

FEBRUARY 1987

A MIX PUBLICATION

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Build a $40 digital drum

Misconceptions about MIDI

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Roland MIDI-to-CV box

Softsynth for Mac

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4. Lo strig	4. Piano 3	4. Flugelh	4. Syn Feed	4. COrgan 2
5. Strings	5. Piano 4	5. Trombon	5. Syn Harm	5. EOrgan 3
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26. Harpsic	26. High Tin	26. Cello 2	26. Syn Bas 3	26. Harp 3
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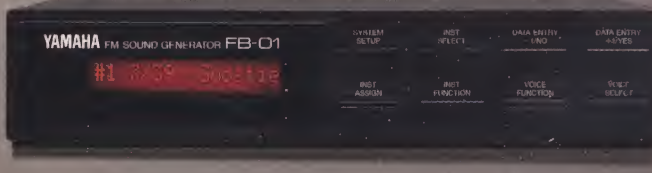

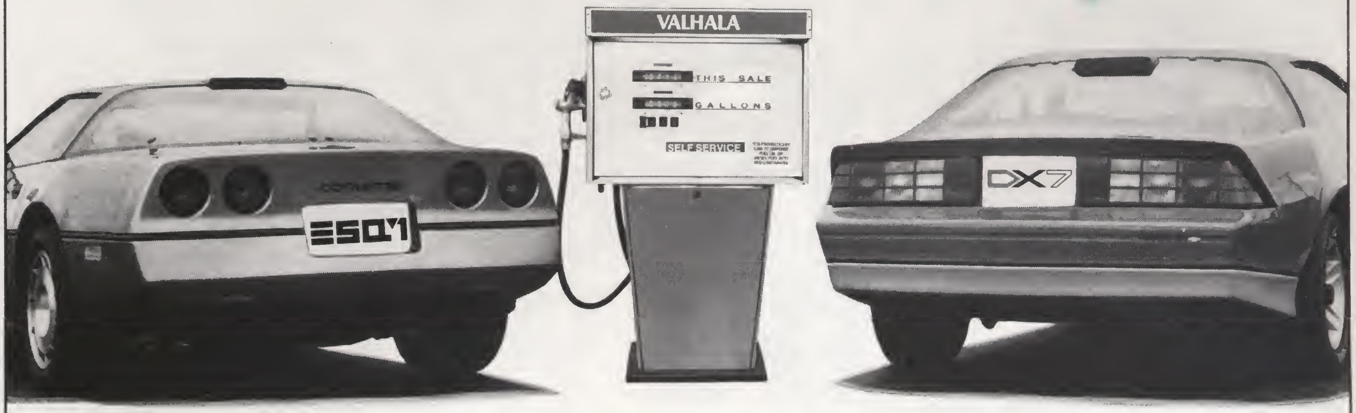

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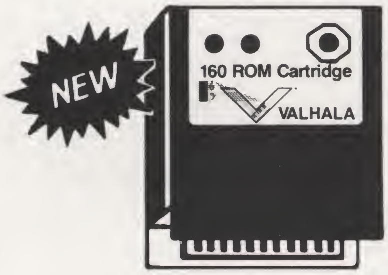

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Electronic MUSICIAN

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COVER

Software has moved out of the expensive land of big business and academia to the world of the working musician. Computers and software can open incredible music possibilities, save time and aid in creativity. This month is packed with software features, from programs you can enter yourself, to reviews, to tips that will make your software dance for you. Illustration by Dave Marrs.

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Editor's Note

In the July '86 issue of **EM**, Steve Sagman explained why, due to the strong yen and weak dollar, the price of Japanese goods had gone up. But why are prices of some U.S.-made, computer-based products starting to go up as well?

A few years ago, U.S. semiconductor companies charged that Japanese companies were "dumping" EPROM chips—in other words, selling EPROMs at below cost in order to gain market share. After lengthy legal maneuverings, the government implemented "Fair Market Value" (FMV) prices on Japanese ICs, principally DRAMs (dynamic RAMs) in order to protect U.S. industry. In some cases, chips that had been selling for $2 to $3 went up to $5 to $8 overnight.

Remember, RAMs are an essential part of any computer—and of any sampler, for that matter (samplers typically have as much RAM as a good personal computer). So, companies that used RAMs were faced with stiff price increases in the cost of materials. Suppose a sampler uses 16 RAMs that now cost $3 more than they did previously. That means an extra materials cost of $48, which translates to an increase of anywhere from $100 to $200 more in the list price.

Well, those of us in the U.S. are all willing to chip in a few bucks to protect jobs in this country, right? Only problem is, by the time the new pricing on Japanese chips took place, the U.S. RAM industry had pretty much packed up and gone elsewhere (e.g. Japan). So now the Japanese companies were getting more bucks for the same products they had been supposedly selling below cost only a few months earlier.

Ah, but there is a loophole. Equipment assembled offshore is not subject to the FMV prices, so some U.S. companies started shifting their manufacturing away from the U.S. to foreign countries where they could get better prices—and thus exported jobs, furthering weakening the U.S. economy.

Who benefits from all this? Not the consumer, who pays higher costs for products made in the U.S. using Japanese RAMs. Not the U.S. manufacturers who now must pay more for chips. Not the workers who might lose jobs because it's cheaper to make products overseas, and not the U.S. semiconductor manufacturers, for whom this action was too little, too late.

The beneficiaries, as near as I can tell, are Japanese semiconductor manufacturers (who now get higher prices for their chips), and, curiously enough, IBM and AT&T—both companies who make their own RAMs and therefore have nothing to lose from these shenanigans. Certainly IBM will be in a more competitive position vis-a-vis U.S. PC-compatible manufacturers.

Don't blame the Japanese in all this; it's not their fault that they are smart businessmen. And don't blame U.S. semiconductor manufacturers; the U.S. government doesn't subsidize them (as is the case in Japan), and the manufacturers had been put in an untenable position. Perhaps this is indeed a classic case of good intentions gone awry—and, as is so often the case, the results are not what we had expected.

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Letters

MIDIFEX/MIDIVERB: True Stereo?

First, let me say thanks for producing such a great magazine—all work stops around my office when **EM** arrives in the mail every month! I just wrote in to set straight any possible misimpressions created by your otherwise on-the-money review of the nifty new Alesis MIDIVERB and MIDIFEX units (November '86 **EM**).

You mention that "both the MIDIVERB and MIDIFEX are true stereo units," but alas, those two RCA input jacks on the back are actually mixed together internally *prior* to A/D (analog-to-digital) conversion and signal processing. This may seem like a fine point, but to those of us involved in digital effects and reverberator design, "true stereo" means two channels of A/D conversion (regardless of whether it's implemented by two sets of conversion hardware or by a single shared circuit).

Having two independent input channels opens up a whole realm of signal processing possibilities that aren't available with a single mixed input, since processing algorithms can take advantage of spatial panorama information inherent in the stereo signal. Signal processors with dual A/Ds are also theoretically capable of entirely independent processing for each channel—the latest great low-end manifestation of this is the new SDR1000 digital reverb from Ibanez/Sony, which features several dual reverb programs. The architecture of units like the MIDIVERB and MIDIFEX unfortunately precludes the possibility of this kind of "split" processing.

Steve Hoge
First Order Effects

Steve—Thanks for your assistance. Indeed, although the outputs generate individual stereo signals, these are in fact derived from a combined input. Stereo separation is preserved for the dry signals. Sorry if this caused any confusion.

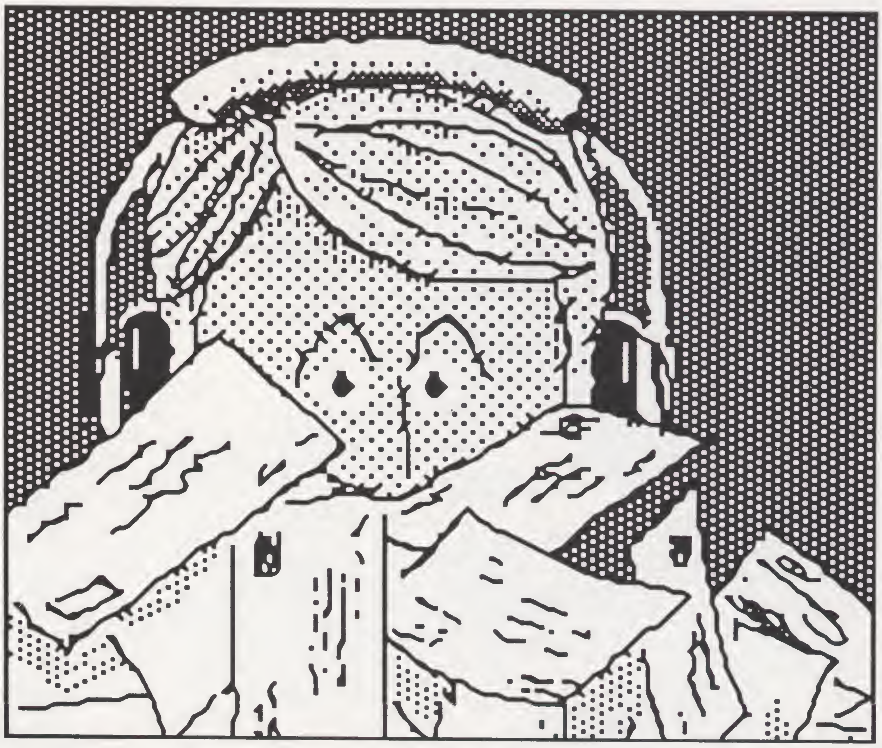
Will the Real Mr. MIDI Please Stand Up

I'd like to know how many MIDI Associations are out there and who really runs the show. How many manufacturers can be given a system exclusive code or is there a limit? Where and for how much can I get the complete MIDI specification for such things as hardware and software design?

George DaNova
LaSalle, Quebec, Canada

George—There are two main associations in this country, the MIDI Manufacturer's Association and the International MIDI Association. (Of course, there are also many user groups that share information about MIDI, but these are in a different league.) The MMA is for manufacturers of MIDI equipment, whereas the IMA is oriented towards end users and musicians. Also, the Japanese MIDI Standards Committee works in conjunction with the MMA to codify improvements and modifications to the MIDI specification. No one entity really "runs the show," since these associations have a diverse membership where proposals are worked out among the entire industry. For example, should there be not enough system exclusive codes to handle all MIDI manufacturers (this is not yet the case!), the MMA would figure out how to get around this problem.

A detailed MIDI specification is available from the IMA for $30 to members, $35 to non-members. A $2 addendum is available to those with older versions of the spec. They also publish a monthly newsletter. For more information, write the IMA at 11857 Hartsook St., N. Hollywood, CA 91607; tel. 818/505-8964.



Don't Forget VHS Hi-Fi!

I was stunned to read Tim Fluharty's article "Mastering with Beta Hi-Fi in the Home Studio" (October '86 **EM**). Except for a cursory declamation against VHS Hi-Fi, the article runs for three pages talking only about Beta. Who cares if Beta came first? The basic specs of each system are the same, and in some individual cases, VHS Hi-Fi decks exceed Beta by a few dB—but here we get into an "Atari vs. Amiga" style of debate. As a video professional myself (who has been mastering audio on hi-fi tracks for two years), I would like to comment on Mr. Fluharty's three points: 1) In my area, I can now buy a VHS Hi-Fi deck for $300. How much cheaper would you still want to go and expect a quality machine? And I've yet to see a Beta Hi-Fi deck for that price. 2 & 3) In all my years of working with four VHS machines, they have been virtually trouble-free. VCRs don't need to be serviced that often, unless they are abused, and I have never had any problems related to the hi-fi section. The bottom line is that this article is encouraging potential VCR owners to buy into a format that is becoming obsolete, while there is a fine alternative. Besides, VHS tapes are cheaper than Beta, and you can get up to eight hours on one. Your magazine deals a bit with video as well as audio, so let me also say this: VHS is and always has been the only professionally accepted half-inch VCR format! You don't see Beta decks in a studio editing suite, but you almost always see two or three VHS decks. One final note—for people who are looking for inexpensive quality mastering, consider using dbx type II. You can pick up a unit now from places like DAK for under $60, and improve the signal-to-noise ratio 16 dB or better than hi-fi tracks anyway.

Thanks for hearing me out and letting me air out a little.

Kenneth Tkacs
Falseface Productions
Milford, CT

Kenneth—Several other people have written to say that VHS Hi-Fi works just as well as Beta Hi-Fi, yet about an equal number have commented that Beta is better, and they're glad we published the article. Did someone say Atari vs. Amiga? And to further complicate matters, one engineer at a pro studio said that he experienced inconsistent results when using PCM adapters with VHS, but had no problems with Beta, so he stopped using VHS gear. The point of the article wasn't that VHS Hi-Fi is not useful; rather that Beta, which is (as mentioned in the article) an "underdog," could be a better value in some applications. Remember, if an article is published in October, it was written during the early summer. In California during early 1986, Beta Hi-Fi units were regularly selling in the $250 to $300 range (this, by

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The Kurzweil 150 is one of the most unique synthesizers available on the market. The 150 is a real-time additive synthesis machine with multiple resident sound blocks and extensive programmability for extraordinary user creativity. It's a rack-mountable, multi-timbral sound source with 16 voice polyphony, designed to work with any MIDI controller.

The 22 resident voices and 69 preset programs are just the beginning. You can modify and combine them to create new programs, and save up to 186 of them in the 150's non-volatile memory.

For example, you can create infinite numbers of sound combinations. You can split a keyboard into three regions with up to seven layers of sound in each, and each sound layer may be individually tuned, transposed and balanced. Layers and regions can be copied and inserted in other locations. Combined with the many programmable modifiers, the Kurzweil 150's sound layering techniques enable you to create distinctive sounds with remarkable ease.

You can vary the overtones of each sound using Kurzweil's unique Timbre Shift™ capability. You can also control how effects such as pitch bend, chorusing, vibrato and graphic equalization are applied. You can even use polyphonic afterpressure to control pitch bend, vibrato depth and chorus detune on a note-by-note basis.

The 150 Fourier Synthesizer also provides additional editors which allow you to modify velocity and loudness response, tuning intervals, program mapping and controller assignments. And, of course, the 150 has full MIDI implementation, with Omni, Poly and Multi modes of MIDI operation.

Best of all, the Kurzweil 150 Fourier Synthesizer is designed to get even better. With our Sound Laboratory for the Apple®IIe, written by Hal Chamberlin, and additional Sound Blocks, the 150 is truly an incredible instrument for the creative musician.

Now with Sound Laboratory and Additional Sound Blocks.

The Kurzweil MIDIBOARD®
The Kurzweil MIDIBOARD is a powerful master MIDI keyboard controller with unique features unavailable in any other product of its kind: the ability to control 8 MIDI devices, true polyphonic key pressure sensitivity, and completely adjustable keyboard response.

The MIDIBOARD's 88-key weighted wooden keyboard has the feel and velocity sensitivity of a concert grand piano. In addition, the MIDIBOARD produces release velocity, polyphonic afterpressure, and channel pressure, which let you shape the dynamics of individual notes as you play them. Dedicated sliders adjust the keyboard's attack, release, pressure, and retrigger sensitivity, enabling you to fine-tune the MIDIBOARD's response to your own playing style.

The MIDIBOARD lets you set up and control up to eight MIDI instruments, then conveniently change any of 44 operating parameters that tell how the MIDIBOARD controls any one of those instruments. Multiple parameters tell how the MIDIBOARD's complement of wheels, sliders, buttons and external controls are connected to your instruments. YOU assign what controls what . . . so each of the MIDIBOARD's 12 assignable controls is where you want it, when you want it. You can save up to 99 of your favorite setups in the MIDIBOARD's non-volatile memory, or store them on cassette tape or via MIDI for safe keeping.

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the way, bears out what several people have told me about Beta having a larger West Coast than East Coast market share); it was several more months before VHS Hi-Fi started to even approach those kinds of prices in this part of the country. Considering that a mastering deck is often dedicated solely to mastering, price could be considered more important than a video capability that might never be used. Although I have a VHS deck for video work, I am seriously considering dedicating a Beta Hi-Fi to audio mastering for the reasons given above. Besides, I'm sure something better will come on the market before either a VHS or Beta machine wears out! Of course, if you plan to use your "mastering deck" for video as well as audio, it's important to realize that estimates place Beta's market share somewhere in the 5% to 10% range—definitely not the dominant video technology.

Concerning dbx type II, it is an inexpensive alternative—all the more so when available at a fraction of the original cost from an outlet such as DAK. Remember, though, that despite a 90 dB dynamic range, Beta or VHS Hi-Fi recording purportedly offers better modulation noise, dropout, wow, flutter, and frequency response characteristics (and, as you point out, lower tape costs). None of this is said to contradict your points, but rather, to emphasize that there are as many sides to a story as there are people who have opinions. Since no product is perfect, we have to decide which tradeoffs are most important to us. True, most of the world chooses VHS. But for many others, Beta is what best fulfills their needs.

SK-1 Update

As an update to my "From Ha! to SK-1" article (October '86 **EM**), the Casio SK-1 digital sampling keyboard has been added to Tandy's Radio Shack line and relabeled as the "Concertmate-500"; it sells in stores nationwide for $99.95.

James A Lisowski
S. Milwaukee, WI

Error Log:

In "Choosing the Right Sampler," (Dec. 1986) the figures given for the Kurzweil 250 were out of date. The price is now $14,500; sampling is done in an 18-bit floating point format, not 16-bit. The maximum sample rate is now 50 kHz (40 seconds maximum sample length), and minimum sampling rate is 5 kHz (400 seconds maximum sample length). Also, the K250 Base Sampling Expander (same as the K250 but without a keyboard) is $11,500. Also, keep in mind that Kurzweil will probably come out with some new stuff between the time we write this and the time it sees print. . . .

In the schematic for "A Voltage Controlled Counter" (Nov. 1986), ICs 4, 5, and 6 are shown as inverting gates (NOR and NAND gates); in reality, however, they are non-inverting (OR and AND gates). This means that the circles on the outputs should not be there. However, the pinout numbers are correct as shown.

*OK, gang, pull out those back issues and **write in the corrections** so your files are up-to-date and accurate!*

Best of PAN

With so much activity going on with networks, we've decided to excerpt some of the more lively and/or interesting discussions and run them as part of our Letters section. We thank Perry Leopold of PAN for his help with this month's installment (please note that all messages are copyright 1986 by the PAN Network), and invite other bulletin board SYSOPs to inform us of what's happening on their services.

Sequencing—FB01 Configurations

I just discovered something that may be of interest to other FB01 owners. If you've used the box for long, you've already discovered that the real action is in the configurations. Unfortunately, there is no way to select a configuration remotely from a sequencer. So, if you want to start a song with the box configured as say, four instruments, and then switch to single-instrument configuration, you have to do so manually.

Fortunately, if your sequencer records and plays back system exclusive data, there is a marvelous alternative. You simply dump the current configuration buffer to your sequencer at the point where you want the configuration to change. When you play back the song, this configuration will be sent to the FB01's edit buffer (it isn't stored as any particular location) at exacty the right moment. I have tried this with the Roland MC500, and it definitely works. Just don't try to change configurations while the FB01 is playing!

The advantage of this approach is that you aren't limited to the 16 memories in the FB01. And even if you rearrange configurations in the FB01, whenever you play back a sequence, the correct configuration will be used.

—Paul Grupp

The Mac MegaScreen

Wow. I just spent three hours with a Megascreen. It is phenomenal. This is a hardware/software package with a 19-inch (measured diagonally) monitor and a user-configurable display resolution that displays the normal Mac full screen—or—provides up to 1024 × 900 pixel resolution. It has NTSC or PAL output for display on video monitors, or recording right to a video recorder. It is from MicroGraphic Images, 20954 Osborne St., Canoga Park, CA; tel. 818/407-0571. The price is $2,995 retail for modification, software, and monitor.

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And, with the D.W.A.P. (Digital Wave Analog Processing) tone unit being MIDI-equipped, you'll be able to produce the sounds of wind, keyboard and stringed instruments too. You'll completely redefine the term..."Total Percussion".

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Weather Report

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In Canada: Pearl Dept., 3331 Jacombs Road, Richmond, B. C. V6V 1Z6
In United Kingdom: Pearl Music Ltd., Dept. SYX, 11 Garamonde Drive, Wymbush, Milton Keynes, England MK8 8DF.

PEARL

What does this mean for Mac music enthusiasts? Imagine this: Boot up *Professional Composer* and display 22 staves of six to eight measures on the screen at one time (really!!).

With *Performer*, you have a track window that can easily show 48 tracks with 25 letter descriptions on each. There is enough room on the screen to move the control panel, metronome, and memory windows down to the bottom and have space in the top left "quadrant" of the screen to open up any dialog box (like the step record window) without covering up any of the other windows. Open up tracks to edit, and leave them hanging around for a while in the top right-hand side—they won't get in the way. How about four or five edit windows? No problem.

Or what about the new Opcode librarians, like the DX Librarian/Editor? The new Libraries have a resize button, right? Well, Bo Tomlyn nearly dropped his jaw when I opened one of my libraries of 1,034 sounds and stretched the window open to the full size of the screen to view them all at one time. Amazing!

Deluxe Music Construction Set from Electronic Arts can also take advantage of the large screen size. Move all the input/edit panels out of the way to the bottom, and look at a full 8½ × 11 page of music on the screen. Stretch it, use the score setup to resize it, set section markers for the whole page and watch it flash the notes as it plays out through MIDI.

So now add Switcher and a couple megabytes of memory, and you can go from one gigantic screen of information to the other, and have a work station that puts anything else to shame.

Any program that has been written to the Apple specs for windows and resizing (originally from the Lisa days) can take advantage of the larger screen. Of course the page layout programs and drafting programs work, since these programs are the reasons why this thing was built.

Digidesign Sound Designer packages have waveform windows with drag bars and resize buttons. Imagine stretching out the window and seeing an *entire* sample with sufficiently high display resolution to see individual wave periods. Or having two or three samples open and not overlapping. I will be testing all the music software I deal with and seeing how each reacts to the Megascreen.

Another useful new development, a program called Servant, is from Andy Hertzfeld (one of the original Mac development team and the creator of Switcher). It is like Switcher, except that you don't have to "switch" from screen to screen. All the programs that you want to run remain visible as different windows on one screen, and when you touch a window, its menu bar returns to the top. So, with the Megascreen and Servant, you can leave windows their normal Mac size and show *four programs simultaneously* on one screen. Not really multi-tasking yet, but pretty close.

I hope all will excuse the verbosity, it's just that this is rather exciting, don't you agree?

—Marc Mann

Left Handed MIDI Guitars

Now that I've spoken to several dealers and manufacturers about MIDI guitar controllers, everyone has said that the left-handed market is too small to consider. It seems to me that since there's no need to take account of acoustics or relative string weights, there can be no insurmountable reason for not building the hardware in such a way that it could be easily converted from right-handed to left-handed operation. There will surely be an ever-increasing number of manufacturers building guitar controllers to compete with each other in the overwhelmingly right-handed market.

But it looks as if no one is going to cater to the left-handed market *at all.* Therefore, the first manufacturer who builds an ambidextrous guitar controller will lock up the left-handed market entirely. This market may be small, but I doubt if it is so small that a monopoly of it wouldn't be worth having. A market that includes (or would have included) Paul McCartney and Jimi Hendrix cannot be entirely insignificant. In fact I would be very interested to know just what proportion of guitarists (and indeed keyboardists) are left-handed. I'm constantly surprised at how many left-handed people there seem to be around these days, especially amongst those who are creative, insane or criminal—which must cover a fair smattering of musicians . . . (grin).

—Douglas Adams

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OPEN MODE: COMPLETE FLEXIBILITY with **Dr. T's** exclusive 'open ended' sequence structuring. Cue parts in and out or overdub additional tracks at any point in a song.

EDITING: TOTAL note-by-note and cut-and-paste editing for all types of MIDI events. Includes transpose, invert, auto-correct, rechannelize, time-reverse and velocity scaling. Tracks or sequences can be split by keyboard position, and thematic variations can be AUTOMATICALLY generated by the program.

STEP-TIME: Record from your synth using the computer to specify timing..

■ MIDI RECORDING STUDIO **ATARI ST**

A simplified, eight-track version of the KCS, including virtually ALL of the editing features. Files are compatible with KCS files and a full trade-in allowance is offered.

■ CZ PATCH, DX HEAVEN ST, FB01/DX100 EDITORS **ATARI ST**

ALL programs feature mouse oriented editing, GRAPHIC envelope display, multiple banks in memory, additional patches on disk, and fast, intuitive operation. CZ PATCH includes envelope copying, TIME FORMAT envelope display, level and rate scaling and line copying. CAGED ARTIST Bob Melvin's DX HEAVEN ST and FB01/DX-100/27/21 editors feature MIDI merge, ENVELOPE DRAWING with the mouse and a PATCH RANDOMIZATION feature which can generate new sounds from existing sounds. MORE EDITORS coming soon.

ALL editors will be loadable from the KEYBOARD CONTROLLED SEQUENCER and will be able to play sequences directly from their main screens.

■ MATRIX 6, FB01, DX-100/27,21, PCM 70 EDITORS **APPLE and C64/128**

These CAGED ARTIST programs feature intuitive editing with fast parameter selection using joystick or cursor keys, multiple sets of patches in memory, MIDI merge, and additional sounds on disk.

■ SCORING PROGRAMS

THE COPYIST: A publishing quality score-printing, editing, and music transcription program that interfaces with Roger Powell's **TEXTURE SEQUENCER** and Octave Plateau's **SEQUENCER PLUS**. Supports HP Laser-Jet+, HP Inkjet, Epson printers; and HP/Roland plotters. Requires 256K and either Color Graphics or Hercules Graphics cards. Ability to enter music via keyboard or mouse. Compositions can be played through MIDI. **Coming soon on the Atari ST.**

CONVERTAFILE: Converts sequences from **Dr. T,** Passport, and other Commodore sequencing programs into files readable by the Music Shop for MIDI or Music Shop programs. Includes part transposition, assignment of specific MIDI channels to specific staves, and more.

■ OTHER C64/128 and APPLE PRODUCTS (*indicates C64/128 only)

Keyboard Controlled Sequencer
(C128 version reviewed in Oct. Keyboard)
Algorithmic Composer*
(Reviewed in Oct. Keyboard)
Echo Plus*
DX Patch Editor/Librarian
CZ Patch Editor/Librarian*
CZ Rider
(Reviewed in Oct. Keyboard)
JX-8P Editor/Librarian
DX Patches
Model T MIDI Interface
CZ RAM Cartridges w/64 sounds
Bach Songbook
(Also available on ST/IBM)

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NEWS FLASH

▶**Yamaha Introduces Three New Products**

As we were going to press, Yamaha introduced three new products in Japan at X-Days, Yamaha's educational convention. The **DX7 IID** and **DX7 IIFD**, enhanced replacements for the discontinued DX7, retain full voice compatibility with existing DX7s but also include new features such as: 11 preset and two user-definable microtonal scales, enhanced master keyboard capabilities and patch mapping, true split and dual modes, 64 on-board voices that can include any one of 32 performance memories, two real time parameter change sliders, panning, multiple LFOs, unison mode, and in the case of the IIFD, a 1 Megabyte floppy disk drive for MIDI data *and* voice storage. A new cartridge holds 64 voices and 32 performance memories; old cartridges are compatible with use of a simple adapter. Thanks to 16-bit internal technology, instead of the DX7's 12 bits, the sound is clean and free of "grit." Prices have not yet been set.

The **RX5** drum machine features 24 individually-tunable, *editable* voices. It uses the RAM 4 cartridge (designed for the new DX7) to store drum patterns and voice editing parameters. The RX5 syncs to both MIDI/FSK, and accepts song pointer.

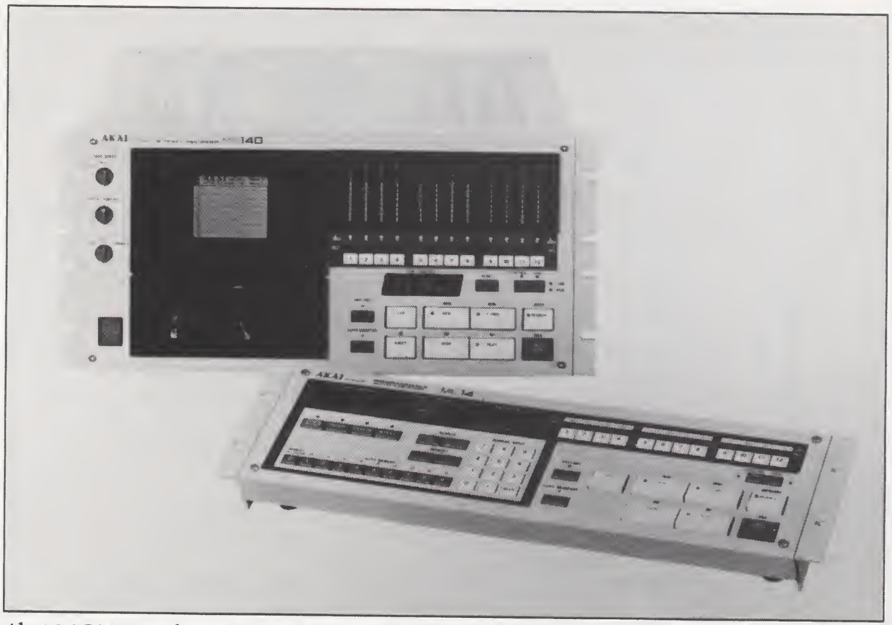
Finally, the **TX81Z** is a low-cost expander module that's similar to the FB-01 (i.e. four operators, extensive multi-timbral capabilities), but allows for front panel editing and programming, and includes a variety of waveforms (not just sine waves) for each operator. The 12-bit (as opposed to the FB-01's 8-bit) technology gives sound quality equal to the old DX7.

Don't miss next month's issue with Craig Anderton's complete on-location report from Japan on these and other developments.

ACCESSORIES

▶The **SynHance Voice Vault TX Series** stores voices in a rack-mount, battery back-up RAM unit. The **TX-192** ($299) stores 192 voices, and the **TX-512** ($499) stores 512 voices.

Harmony Systems
P.O. Box 2744
Norcross, GA 30091
404/662-8788



Akai MG14D rack mount recorder and ML14 autolocator

▶A plastic, wallet-sized **Harmonica Key Selector Card** (straight harp and cross harp in three positions referenced to various keys) is available by sending a self-addressed, stamped envelope to:

Hohner
P.O. Box 15035
Richmond, WA 23227
804/798-4500

COMPONENTS

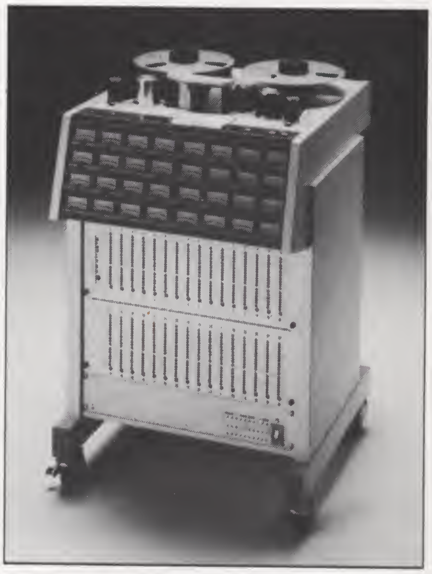
▶The **2016** microphone preamp ($12 single quantity, $4.50 in thousands) can also serve as a low-noise bus summing amplifier. Features include 180 pV/root Hz noise figure (with 150 Ohm source impedance), ±36 Volt operation, and the ability to source/sink 50 mA.

Solid State Micro Technology for Music
2076B Walsh Avenue
Santa Clara, CA 95050
408/727-0917

PUBLICATIONS

▶The latest version of the **Rock Synthesizer Manual** ($11.95), by **EM** author Geary Yelton, covers methods of analog and digital synthesis, controllers, MIDI, sequencers, and programming techniques. 126 pages, softcover. Available in music and book stores, or direct (add $1 p/h) from:

Rock Tech Publications
171 W. Putnam Ferry Rd.
Woodstock, GA 30188



Otari MX-80 multi-track recorder

▶**Entertainment Industry Contracts** ($320) is a four-volume set that covers entertainment contracts (books, movies, music, TV, and theatre) from the point of view of both the business and artistic sides of show business.

Matthew Bender and Co.
11 Penn Plaza
New York, NY 10001
800/223-1940 (Ask for Michele Zeltz
Director of Advertising)

RECORDING

▶The **ATR-80/24** is a 24-track, 2-inch multi-track recorder that accommodates 14-inch reels. It also includes a 4-bit microprocessor and 8-bit D/A converter circuit to provide seamless punch in/out and edits. Other new products include the **M-600 Series** of modular mixers, **ES-50 Synchronizer, CD-501 CD Player,** and the **Porta Two** 4-track cassette recording system.

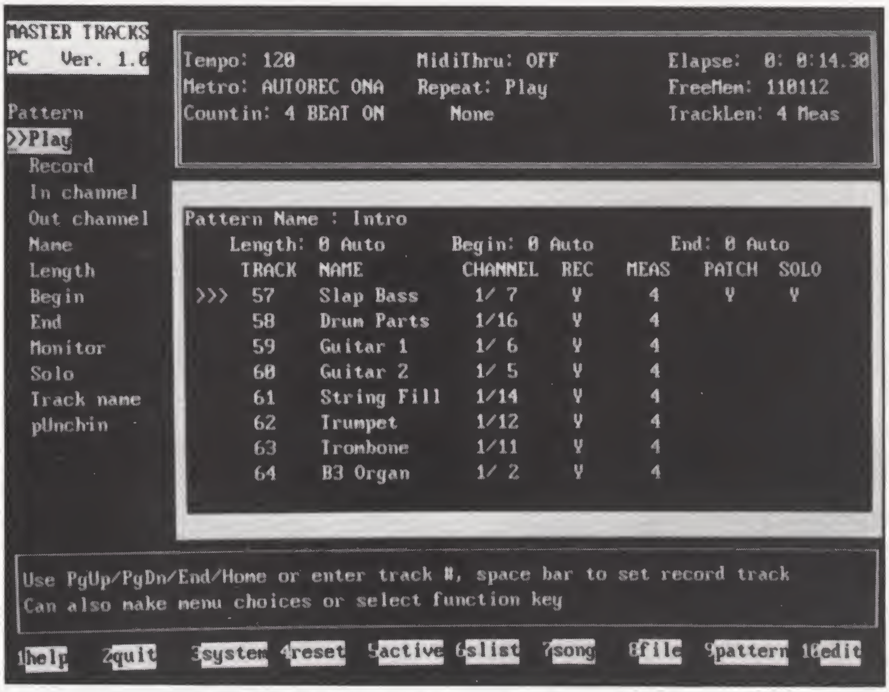
TASCAM
7733 Telegraph Rd.
Montebello, CA 90640
213/726-0303

▶The **MX-80** ($34,950 for 32 tracks, $27,950 for 24 tracks) runs at 30/15 or 15/7.5 ips, uses 2-inch tape, and includes HX-Pro™ to optimize bias. The MX-80 also includes a built-in autolocater with three cue point memories, repeat function, and return to zero.

Otari Corporation
2 Davis Drive
Belmont, CA 94002
415/592-8311

▶The **MG14D** rack-mountable recorder features 12 audio tracks as well as a sync track and internal time control track. The matching **ML14** autolocator provides computer-assisted functions such as memory search, multiple event auto punch in/out, multiple event playback mute, and repeat.

Akai Professional
P.O. Box 2344
Fort Worth, TX 76113
817/336-5114



```
MASTER TRACKS
PC   Ver. 1.0   Tempo: 120           MidiThru: OFF       Elapse:   0: 0:14.30
                Metro: AUTOREC ONA   Repeat: Play        FreeMem: 110112
Pattern         Countin: 4 BEAT ON     None              TrackLen: 4 Meas
>>Play
  Record
  In channel
  Out channel   Pattern Name : Intro
  Name             Length: 0 Auto       Begin: 0 Auto        End: 0 Auto
  Length             TRACK  NAME           CHANNEL  REC    MEAS    PATCH  SOLO
  Begin         >>>   57    Slap Bass       1/ 7     Y      4        Y      Y
  End                 58    Drum Parts      1/16     Y      4
  Monitor             59    Guitar 1        1/ 6     Y      4
  Solo                60    Guitar 2        1/ 5     Y      4
  Track name          61    String Fill     1/14     Y      4
  pUnchin             62    Trumpet         1/12     Y      4
                      63    Trombone        1/11     Y      4
                      64    B3 Organ        1/ 2     Y      4

Use PgUp/PgDn/End/Home or enter track #, space bar to set record track
Can also make menu choices or select function key
```

Screen display from Master Tracks PC

SOFTWARE

▶A new IBM-compatible sequencer, **Master Tracks PC** ($395), supports the MPU-401 and includes song pointer. A dynamic memory management scheme allows re-combining and extracting parts of music for use at any point in any piece.

Passport Designs
625 Miramontes St., Suite 103
Half Moon Bay, CA 94019
415/726-0280

▶**Aegis Draw Plus** ($259.95) is a computer-aided design package for the Amiga computer. It allows up to six independent drawings of 256 layers each with a 512K Amiga; drawings (which can use up to 16 colors) may be saved in Amiga's standard IFF file format.

Aegis Development
2210 Wilshire Blvd. #277
Santa Monica, CA 90403
213/306-0735

▶**Sample libraries** ($25 per disk, $199.95 for ten-disk set) are available for the Emulator II, Prophet 2000/2002, Ensoniq Mirage, and Akai S900. **Sound collections** are available for the ESQ-1 ($24.95, data sheets, 40 sounds); DX7/TX7/TX816 (two sets, 128 sounds per set, $99.95 for ROM or $59.95 for disk per set); DX100, DX21, DX27 (two sets, 48 sounds per set, $24.95 for cassette, data sheets, or disk per set); Casio CZ-101, 1000, 3000, 5000, CZ-1 (four sets, 40 sounds per set, $19.95 for data sheets or disk per set; two sets available in ROM cartridge, $69.95 per set); Korg Poly-800/EX-800 (64 sounds, $24.95 for cassette or data sheet); and Roland Alpha Juno 1.2 (two sets, 64 sounds per set, $24.95 for data sheets or cassette). Demo cassettes for each synth or sampler, $5.

MIDImouse Music
Box 272
Rhododendron, OR 97049
503/622-5451

▶**MasterPiece** ($475) for the Atari ST and Macintosh computers offers dual MIDI port capabilities, 32 tracks, 24 sequences, MIDI song pointer, controller editing, randomization, and many other features. **FB01 Design** ($129.95) for the Commodore 64/128 is a librarian/editor for Yamaha's FB01. Features include two independent banks, on-screen keyboard for playing notes, and print screen. **Midi-Tech 64** ($99.95), also for the C-64, is a monitor/system-exclusive-librarian program, designed specifically for education and servicing, that allows the user to view, send, receive, manipulate, and save MIDI bytes from MIDI instruments and processors.

Sonus
21430 Strathern, Suite H
Canoga Park, CA 91304
818/702-0992

▶**Transform,** a series of software modules for the Atari ST, include the **Xtrack** ($149.95) sequencer with song pointer and unlimited tracks, **Xnotes** ($199.95) music composer/score publisher, and **Xsyn** ($99.95) graphic editor/librarian/automatic patch generator/real time recorder for the DX, JX, CZ, and FB01 series of synthesizers.

Beam Team
6100 Adeline St.
Oakland, CA 94608
415/658-3208

▶New educational software titles include **MIDI Jazz Improvisation, Basic Piano Theory Software, AppleWorks.™ Management Templates, Music Appreciation: A Study Guide,** and two others. Prices range from $39.95 to $99.95.

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217/359-7099

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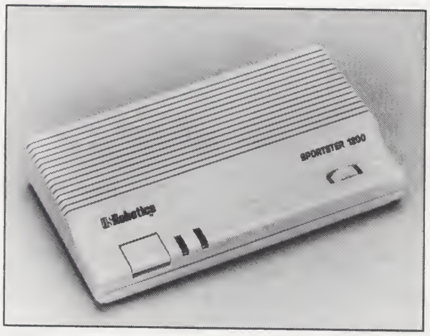
Roland S-50 keyboard sampler

SYNTHESIZERS

▶The **S-50 Keyboard Sampler** ($2,895) offers 14.4 seconds of sampling at a 30 kHz clock rate and with 12-bit linear quantization. The five-octave, 16-voice keyboard allows split or dual modes, and up to 16 multi-samples. A 3.5-inch disk drive stores sounds, and any standard monitor can access the S-50's integral visual editing program. Multi-timbral operation is supported for four MIDI channels. The **S-10** is a lower-cost version with eight voices, a four-octave keyboard, and fewer features. Everyone who purchases a Roland sampler is also allowed unlimited free access to the Roland Sound Bank library of sounds at the authorized dealer where the sampler was purchased.

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040
213/685-5141



USRobotics Sportster 1200 budget modem

TELECOMMUNICATIONS

▶The **Sportster** modem ($149.95) is a low-cost, stand-alone, auto-dial, auto-answer device that operates at 300 or 1200 Baud and connects to any personal computer that has an RS232C serial interface.

USRobotics
8100 N. McCormick Blvd.
Skokie, IL 60076
312/982-5010

OTHER NEWS

▶**Contest I:** The 1987 Third Coast New Music Project is sponsoring a special "Works-on-Disk" MIDI contest as part of a four-day festival of experimental music presentations. The winner will be selected and flown to San Antonio, Texas, for a concert presentation on June 12, 1987. Contest deadline is March 15, 1987; for further information on the contest and rules for eligibility, call 512/226-2142.

The Urban-15 Group
110 Broadway, Suite 500
San Antonio, TX 78205

▶**Contest II:** Korg is supporting the Willie Nelson/Wrangler Music Invitational, a national competition to find talented young musicians in rock, country, and R&B. The talent search is taking place in major cities, and announced by that city's major Adult Contemporary format station. Prizes include a variety of Korg gear, a personal appearance contract with Wrangler, and $10,000 cash. For more information contact:

Korg
89 Frost St.
Westbury, NY 11590
516/333-9100

All prices are suggested retail prices, as supplied by the manufacturers. All prices and specifications are subject to change without notice. Inclusion of product information and manufacturers in this magazine does not necessarily constitute a recommendation by **Electronic Musician** *magazine or its staff; we suggest that all mail order purchases be C.O.D. Contact manufacturers for further information.*

Roland Electronic Percussion Workshop Session 1

How to go from Acoustic to Electronic

Major Discovery!

I can use my acoustic drums as triggers to an electronic drum system! Octapad is the brain of the system. I can connect up to six mikes from my drums to the back of the Octapad (inexpensive transaucer pickups work great for this!)

Can trigger a MIDI drum system from the Octapad using a TR-505 Rhythm Composer as a sound source. For about $1000.– I could buy an Octapad & a TR-505 & have an electronic drum set & still use my acoustic drums. Octapad has no sounds of its own, but can control any MIDI instrument. MIDI makes the Roland system wide open.

It's not like other drum systems where you are locked in.

TR-505

Drums w/mikes connect to Octapad

Octapad

Expansion City!

Can play the TR-505's Snare, Bass, & Tom sounds from my own drums & use pads on the Octapad to play other TR-505 sounds.

Later I can connect extra pads for more sounds, program sequencers or play other MIDI instruments–all from the Octapad.

SPECIFICATIONS

TR-505 RHYTHM COMPOSER

Can be used as a programmable rhythm machine or sound source for the Octapad.

16 PCM Digital Sounds: Bass, Snare, Lo/Mid/Hi Toms, Timbales, Rim Shot, Hand Clap, Open/Closed Hi Hat, Lo/Hi Conga, Lo/Hi Cowbell, Crash/Ride Cymbal

MIDI Connectors In/Out

Battery or AC Powered

Price: $350.00

PAD-8 OCTAPAD

8 Pads

Can Connect 6 External Pads (or 6 Drum mikes)

4 Patch Presets (Set-ups)

LED Program Display

MIDI Connectors In/Out

Optional Clamp set to attach to drum stand

Price: $675.00

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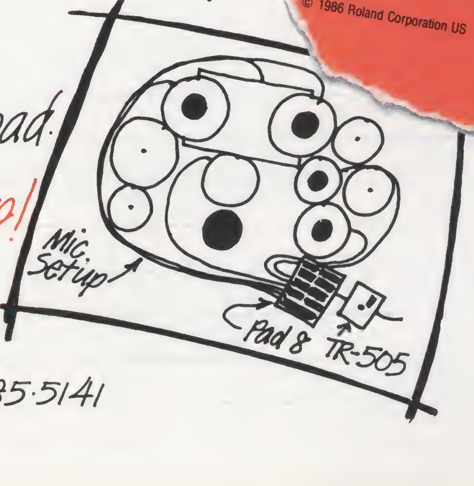
My SetUp!



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the Best!

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Released and Reviewed

BY ROBERT CARLBERG

Send records, tapes, CDs, and music videos for review to Robert Carlberg, P.O. Box 16211, Seattle, WA 98116. And hey, tell 'em you saw it in **EM**!

BILL NELSON
ON A BLUE WING

Bill Nelson, *On A Blue Wing* (Portrait 40146). Bill Nelson, ex-guitarist for Be Bop Deluxe, dropped out of the pop world in 1978 to pursue a more personal vision of music. Since then he's released 15 discs of enigmatic drumbox/synthesizer/vocal musings, recording at home and mostly overdubbing all the parts himself. *On A Blue Wing,* the first newly-recorded music in three years, finds him optimistic, extroverted and sharing instrumental duties with an unprecedented six accomplices. It would serve him right to have a hit off this album.

Brand X, *Xtrax* (Passport 6054). A best-of compilation, the first music from this virtuoso instrumental rock band to be available on CD. Unfortunately the pacing is all off, some of the song choices are arguable, the documentation is error-ridden, and the package seems designed to capitalize on Phil Collins's new-found fame. Sound quality is not appreciably improved over the LPs either—but in spite of *all that,* it's nice to have 66 minutes on digital any way we can get 'em. (Also available, minus 22 minutes, on LP—but why bother?) Now, is the title "Extracts," "X-Tracks," or "Extra-X"?

Tangerine Dream, *Pergamon* (Caroline 1333). In their continuing quest to milk their expired contract, Virgin has gotten rights to this 1980 live concert in East Berlin, previously only available (under the name *Quichotte*) on a difficult-to-locate East German import. Historically it's an interesting set, since it was Johannes Schmoelling's first appearance and the band works out several themes which became *Tangram* later that year.

Synchestra, *Electric Snowflake* (Elfin 105; cassette). Synchestra is Ed Van Fleet on DX7, ARP 2600, Oberheim, Pro One & guitars with John Wilson on percussion, and they've got about nine tapes out now on their Elfin Music label. Van Fleet says he is a "positive kind of person," which is reflected in his beatitudinal music—sort of a cross between Don Slepian and Tangerine Dream. Arpeggiated modal sequences and simple progressions on familiar-sounding keyboards. Pleasingly pacific. $11 postpaid from Elfin Music, P.O. Box 915, Camden, ME 04843.

WEATHER REPORT
THIS IS THIS

Weather Report, *This Is This* (Columbia 40280). Zawinul said in his **EM** interview (May, 1986) that he thought this album, the last to feature Wayne Shorter, "has more life than any of the last five, six albums." He's right. It's been about that long since an album was all ideas instead of mostly filler, and the songs quit when they're over.

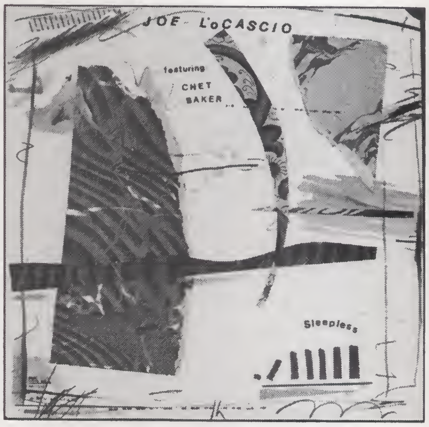
Crossing Point, *Listener Friendly* (City Pigeon 1027). Slick sax-led fusion jazz from a quintet of seasoned sessionmen. The band could pass for a talk show stageband anyday. P.O. Box 43135, Upper Montclair, NJ 07043.

Electronic Music Club of Edmonds Community College, *EMC³*. A third compilation of students' works from this very active Northwest program. The Club has added some digital keyboards to their studio, and as usual the works range from the astonishing (these are *student* works?!) to the "merely" impressive. 20,000 68th Avenue West, Lynnwood WA 98036.

Timothy Andrew Forkes, *Puzzles* (Elfin STF-101; cassette). Recording in Ed Van Fleet's studio, Forkes proves the equipment doesn't make the music, the musician does. He achieves quite a different feel by frequent key changes and more-abstract voicings, though each side still is more textures than tunes. $11 postpaid from Elfin Music, P.O. Box 915, Camden, ME 04843.

The Bond Brothers, *Give Me Some Skin* (Aardvark 70006; single). A rock and roll dance single performed entirely on synthesizers and drumbox—with what might be called vocals on the A side. Mad Dog Records, 1510 Petro Lewis Tower, 717 17th Street, Denver, CO 80202.

Bernie Krause, *Equator* (Nature Company 1011; cassette). Two long suites (16+ min.) combining subtle synthesizer work with nature recordings recorded (mainly by Krause himself) in Africa and California. Though not prolific (only eight albums in 20 years), Krause is easily one of the best. There's a section on side two which combines whalesong, 13 fish noises and electronic percussion which must be heard to be believed. The Nature Company, P.O. Box 2310, Berkeley, CA 90213.



Joe LoCascio, *Sleepless* (Pausa 7200). Pianist/synthesist LoCascio stayed up nights working on his debut album, which also features veteran "cool jazz" trumpeter Chet Baker. The seven tunes (LoCascio originals) find comfortable common ground between progressive fretless bass/synth jazz of the '80s and the languid West Coast Sound of 30 years ago, exemplified by Baker, Gerry Mulligan, Jimmy Giuffre and others. By being simultaneously up-to-the-minute and traditional, *Sleepless* becomes timeless.

Daniel Emmanuel, *Ancient Minimal Meditations* (North Star 2004; cassette). Seeking to express folkloric trance-music through modern minimalism, Emmanuel sets up root patterns on synthesizer and does light improvisations over them. Many of the sounds he uses are definitely of this century, so the ancient connection is more in form than substance. A bonus C-30 displays two other sides of this multi-faceted performer: electronic rock (side A) and Pachelbel, Bach and Mozart transcriptions (side B). P.O. Box 4843, Dallas, TX 75208.

Conrad Schnitzler, *Concert* (1-86-103). The godfather of abstract electronics (see "R&R" in the May, 1986 issue) is out again with another private release thanks to American

---

Robert Carlberg is the national service manager for audio Environments Inc., a nation-wide supplier of original-artist music for restaurants and fashion stores. His hobbies are electronics and music, and particularly electronic music. He was co-founder of SYNEX, *a newsletter for electronic musicians published during the late '70s.*

Roland Electronic Percussion Workshop Session 2

Electronic Percussion and Sampling

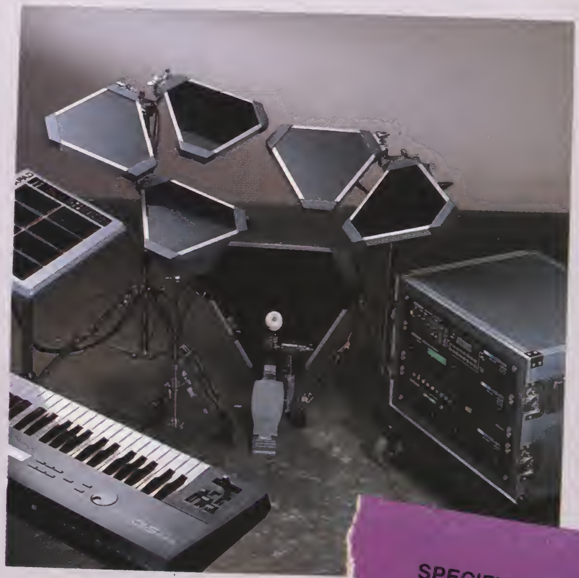
Big Surprise!

Couldn't believe how dynamic & responsive these pads felt. And the sounds of the DDR-30 Module were fantastic! The DDR-30's a Digital Drum Sound Module that rack-mounts for easy set-up. Use the PD-10 Pad for Bass, & the PD-20's for Snare / or Tom.

Sampling: A World of Sounds at the Touch of a Stick

"Sampling is probably more effective for performance on percussion instruments than on any others."

S-10 & S-50 Samplers allow sampling of any kind of sound, then those sounds can be assigned to a drum pad by MIDI. The built-in disk drives let me store samples & have tons of sounds available at a gig.



PD-10 & PD-20 Pad Set

DDR-30 Dig. Drum Module in Rack along w/ other sound modules.

S-10 Digital Sampler

Layering Sounds:

By combining the DDR-30 with a drum machine or a sampler, I can assign more than one sound to a drum pad. This demo layered a Timbale with a Snare with an orchestral hit from the Sampler—all under one pad—KILLER SOUND!

Idea!

Add a DDR-30 to my Octapad Set-up, then add more pads as I like.

Any questions call Roland (213) 685·5141

Roland
Best Stuff!

Don't Forget!

SPECIFICATIONS

DDR-30 DIGITAL DRUMS

6 PCM Digital Drum Voices (four different sounds for each voice) Bass, Snare, and Four Toms

All Voices can be freely edited for Voice, Pitch, Attack, and EQ.

32 Sound Set-ups (8 Set-ups x 4 banks)

MIDI Connectors In/Out/Thru

Price: $1495.00

S-10/S-50 SAMPLERS

Access 16 Samples S-50, 4 Samples S-10

Sampling rate of 30 or 15 kHz for samples up to 30 sec. long

Sample sounds can be tailored by envelope generators

Built-in Disk Drive (S-50, S-10)

FIP display (S-50), LCD display (S-10)

Price: $2995.00 S-50, $1495.00 S-10

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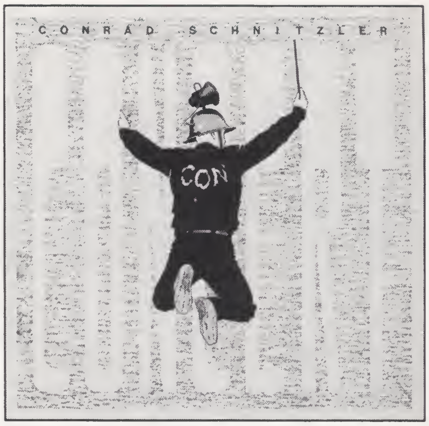


Ken Montgomery. Though some of his past efforts have been more conceptual than musical, this one maintains high standards for variety and novelty in the use of non-keyboard electronics in non-melodic settings. Contact Ken for availability at 118 East 4th Street, Box 11, New York, NY 10003.

Autumn, *Experiments With Environments* (Micart 8207; cassette). The Micart Group is a Belgian cassette label with a couple dozen releases out from various combinations of the three founders. The sample they sent us is electronic rock utilizing drumbox, sequencer and string synthesizers. Though the concept isn't unique, the execution is extremely tasteful and professional (16-track recording). For a catalog and pricing, contact Henk Wallays, P.O. Box 11, B-9880 Aalter, Belgium.

Section To, *Demo Tape* (cassette). Section To is G. Richard Weisberg on synthesizers and Tom Valdez on guitar, who released a tape last year under the name Synaptic Sound. This year they're shopping the new tape around looking for a label to release it as an LP, so hopefully by the time you read this it'll be "available in a store near you." Digital drums, attractive synthesis (sounds like a DX7) and a super recording make their intelligent instrumental rock a blue-chip investment. 1838 48th Avenue, San Francisco, CA 94122.

Ronna Cohen, *Byte the Bullet* (cassette). Ronna's debut tape is filled with original percussion, fascinating synthesis and strong well-turned compositions. Just when you think it's all been done before, a newcomer comes along to make it fresh again. $6 from Experimental Audio, 2201 Graycliff #2001, Dallas, TX 75228.

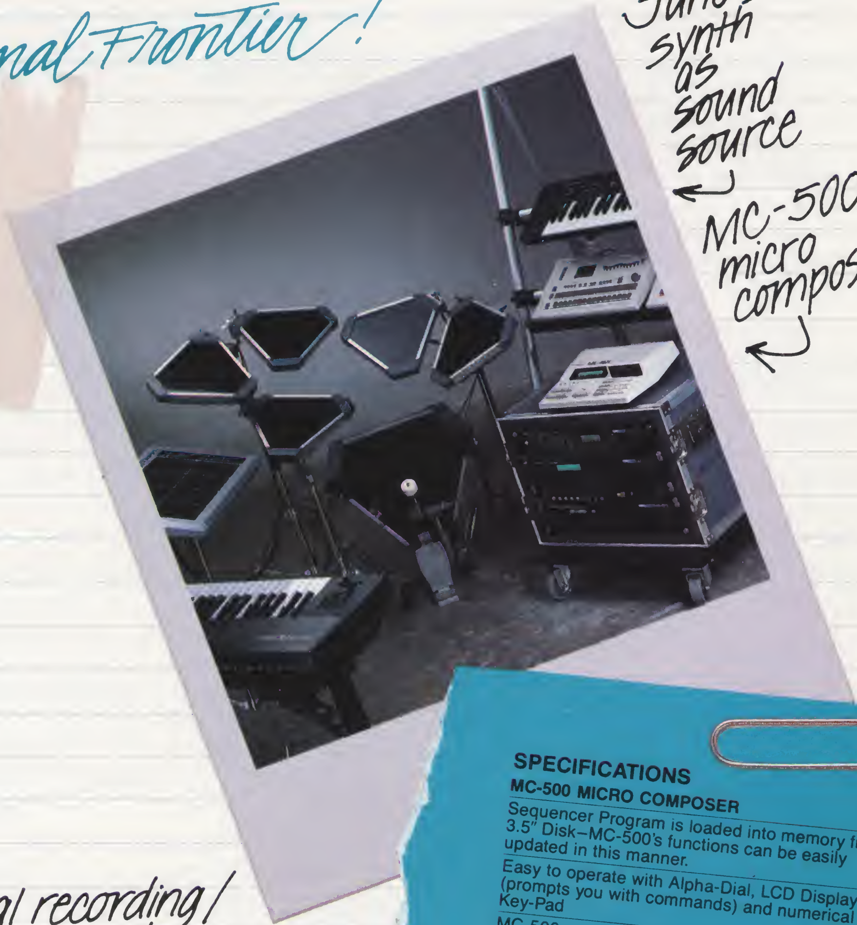
Editor's note: We would like to point out that the above are Robert Carlberg's opinions. We don't expect everyone to agree with him—we don't always—and would also like to remind everyone that things in print are often just an individual's opinion and like everything else, subject to change and even error. EM

Roland Electronic Percussion Workshop Session 3

Get away from just keeping the beat!

melody – the Final Frontier!

Because the Roland system's totally MIDI, I can trigger synthesizers, samplers & any other MIDI instrument off my Electronic Drum Set. By triggering synths it's possible to play bass lines & other melodic parts. Simply assign a MIDI number to one of my Drum pads (or one of the pads on the Octapad) & whenever I hit the pad, I get that note.



MIDI Recording!

Never knew that digital recording/sequencing could be so easy & useful for percussion. The MC-500 Micro Composer has got to be the world's greatest recording machine. Best part – no tape! No rewinding, no change in sound on playback. Reason: MC-500 is recording only MIDI information, not drum sounds. Change tempo or instruments after the fact, make any changes you want, fix mistakes, overdub again & again, try ideas & see if they fit.

Don't Forget!

SPECIFICATIONS

MC-500 MICRO COMPOSER

Sequencer Program is loaded into memory from 3.5″ Disk–MC-500's functions can be easily updated in this manner.

Easy to operate with Alpha-Dial, LCD Display (prompts you with commands) and numerical Key-Pad

MC-500 can be synchronized with MIDI devices and multi-track recorders.

Works with any MIDI Instrument (synth, drum module, drum machine)

Price: $1395.00

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Great for my songwriting!

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Yamaha RX21L Drum Machine ($315) ★★★

This Latin version of Yamaha's RX21 drum machine provides 16 different Latin Percussion sounds: High and Low Bongos, High and Low Timbales, High and Low Agogo, Cowbell, Claves, Muted High Conga, Open High Conga, Low Conga, Tambourine, High and Low Cuica, and Short and Long Whistles. Generally I'm not a fan of Yamaha drum sounds, but these are great! (The decay of the Low Timbale sample is somewhat truncated, but this is not really noticeable in the context of a pattern.) All sounds can be played simultaneously, except the Muted/Open High Conga, High/Low Cuica, and Short/Long Whistle—only one of each pair of these instruments may be played at a time. A few sounds can't be used in the same pattern with others: specifically, the High and Low Agogo cannot be used with the Cowbell and Claves, and the High and Low Cuica cannot be used with the Long and Short Whistle. Tuning isn't variable, but level and accent are; outputs are prepanned in stereo.

The instrument sounds can be played (but not programmed) via MIDI In data, and respond to velocity control. The MIDI note assignment for each instrument is fixed. Fortunately, the note assignments for the RX21L are different from those of the RX11, RX15 and many other drum machines, making it easy to use the RX21L as a Latin "expander" with an existing drum box. For synchronization the RX21L responds only to MIDI clocks, so you'll need a clock-pulse-to-MIDI converter for pulse-based setups.

Total data storage is 50 *patterns* (one-measure percussion sequences) and four *songs* (combinations of patterns), with programming done in real time or step time. Programming is easy, thanks to user-friendly prompts via the LCD. Tempo is global and not stored with the patterns or songs. Swing and ritardando functions are not implemented. Quantization is stored with the pattern, but you should back up important patterns before you experiment—you can't "undo" quantization once a part is quantized.

For external data storage, the cassette interface works easily and reliably; and System Exclusive commands allow patterns to be saved/loaded via MIDI (assuming you have a computer, sequencer, or other device with the appropriate software).

My only quibbles involve the non-backlit LCD (it can be difficult to read under low-light conditions) and the absence of a factory program tape—Yamaha expects you to save your new machine's memory contents to cassette before you begin experimenting. Let's hope your 21L doesn't arrive with its memory wiped!

First Take is just that—people's first impressions of some of the latest products. Ratings are provided by each reviewer according to the following standards:

★★★★★	*The cream of the crop—offers exceptional value or vision*
★★★★	*Very good product with few, if any, flaws*
★★★	*Solid, workmanlike product but not particularly exciting*
★★	*Below-average for its field; often flawed in some way*
★	*Has serious problems—try before you buy!*

We would like to remind you that these are opinions, not gospel, and as always, **EM** *is a communications medium and we welcome opposing viewpoints.*

If you're looking for a sophisticated drum machine, the RX21L may not inspire you. But as a Latin Percussion add-on to an existing drum machine or percussion setup, it's exceptional. Five stars for the sounds; three stars overall.

—Alan Gary Campbell

Yamaha
6600 Orangethorpe Ave.
Buena Park, CA 90620
714/522-9011

Deep Magic DW 8000 Patch Software ($59.95) ★★★★

Programming the Korg DW 8000 synthesizer is not difficult. However, even the programming purists amongst us eventually run into "patchbuilder's block." The last thing you may want to think about is loading in some pre-programmed sounds, but these just may be the key to inspiration.

Deep Magic's very useful set of 320 patches is divided into six groups, all stored on one data cassette with instructions that will neither intimidate the uninitiated nor bore the programming pro. (I found their notes on transferring data between cassette and synth to be more thorough than the Korg owner's manual.) There are some tips on how best to play certain patches, but none on adjusting the parameters to achieve effects other than those the patch itself would dictate (i.e. raising and lowering the noise level to simulate breath on a flute or trumpet patch).

Regarding the patches themselves, I thought there was some repetition within certain voice families, but that can be expected when you approach a synthesizer's sound barrier. Many of the patches demonstrated the strong points of the DW 8000, including some very nice digital delay effects that became the main source of the patch. Because of this, one should hear these patches in stereo for the full effect.

The sets are divided into Industry Standards, Sound Logic, Celestial Timbres, Japan/China/Africa, Sequencer/Arpeggiator, and India/Nashville. The first two groups give the Top 40 musician a good base of working sounds, including a few fun sound effects. The piano, brass and organ patches cover the full tonal range. I would have liked more string patches, but eight is probably enough for most players. The Sequencer/Arpeggiator group is also useful for Top 40/dance material, and has the European techno-pop player in mind. My personal favorites were Celestial Timbres and Japan/China/Africa. As the names indicate, these patches are wonderful for doing New Age and spacey stuff, with a great combination of atmospheric and light percussive sounds. Some of these patches invite you to explore new playing techniques by virtue of their release and aftertouch settings.

The package includes data sheets that show the numerical value settings for each program's parameters. This is useful for manually entering patches if you are putting together a custom patch bank. With the best of the Deep Magic patches, plus your own personal programs, you may see a side of your DW 8000 that wasn't there before.

The Deep Magic library can add to or possibly replace your factory patches, especially if you haven't ventured beyond Korg's sounds. But to me the real beauty of this package is how it inspired me to go further with my own programming.

—Randy Alberts

Deep Magic Music
217 E. 85th S., Suite 298
New York, NY 10028
212/534-0728

Sonus Casio Programmer/Librarian ($129.95) ★★★★

The Casio Programmer/Librarian, for the Commodore-64 and Syntech/Passport/Yamaha/Sequential 242 interface, is an extremely solid and professional—though perhaps unspectacular—program for the Casio CZ series of synths. There are three major menus (main, disk, and edit), each of which has several levels. Level I is the default level; pressing Shift accesses level II; Control accesses level III; and Shift-plus-Control accesses level IV. A label across the

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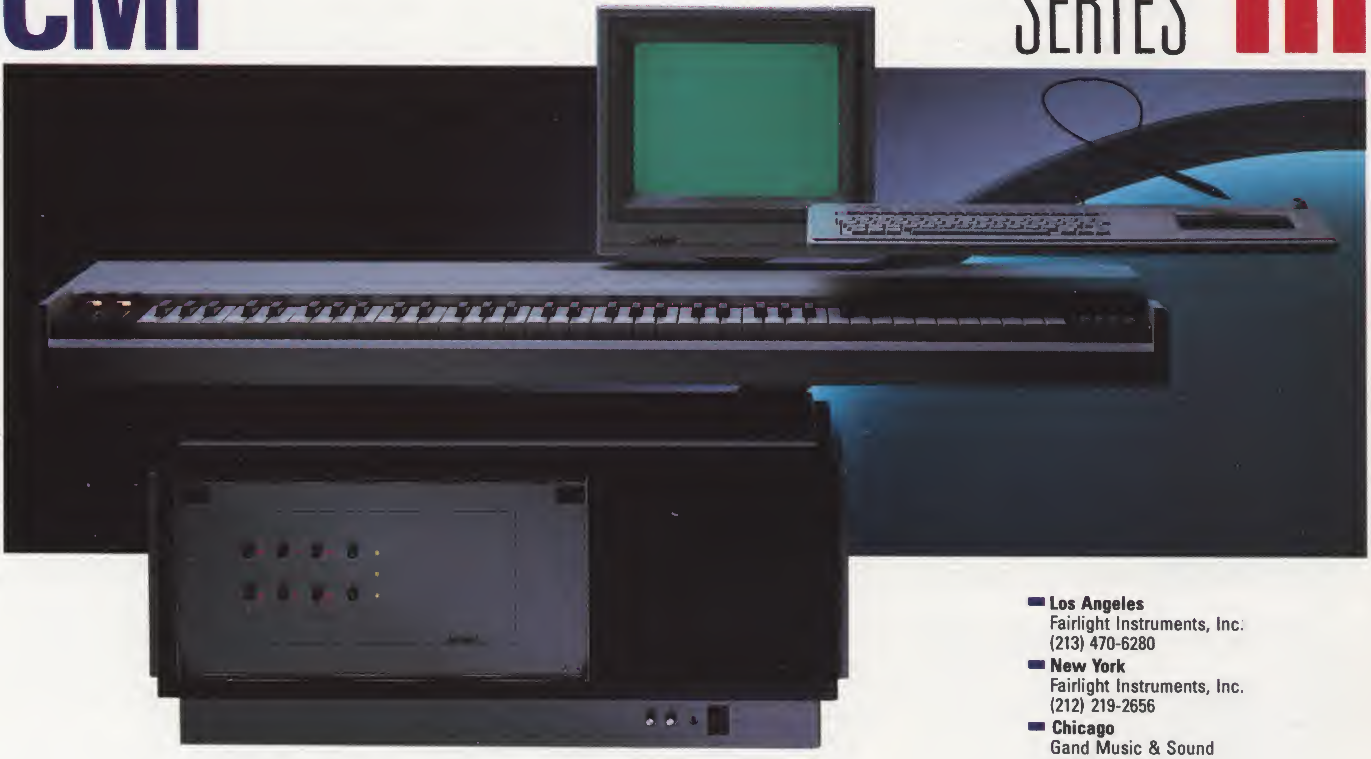

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bottom of the screen shows the various options in each level, and functions are selected within each level by the four function keys. If this sounds similar to the protocol on the Sonus SuperSequencer or Syntech Studio series, that's because the authors for all programs are the same—Tim Ryan and Marshall Otwell. They know a good thing when they program one, because the Programmer/Librarian is extremely easy to use. If you can't remember where a function resides, it's easy to step through the various levels and find what you're looking for in seconds.

You can load two "cartridges" (set of 16 patches) into the Librarian at once, and mix and match patches—or call up single patches and move them around. When editing, the patch to be edited is transferred into a buffer. You can't see all parameters on one screen; there is a separate screen for each of the CZ voice "lines." Since the second screen is only a press of the space bar away, this isn't a problem.

In addition to the standard functions, there are hidden functions (as listed on a plasticized "cheat sheet") for both the main and edit menus that provide more esoteric features (e.g., copy the sound in the buffer to all 16 cartridge locations, send test tones to the CZ in one of three octaves, print hard copy of the screen, and so on). My one complaint about the editor is that once you've moved the cursor to a parameter to be changed, you can't just type in the value—you have to hold a function key to increment the value one digit at a time, or hit shift and the same function key to decrement. Hitting the "+" or "-" keys lets you jump ten digits at a time, but I would prefer to just type in numbers and be done with it.

Despite the use of a C-64, the program is not slow. Banks can be loaded from disk in about 25 seconds from start to finish (including prompts and such)—not bad. Banks can be transferred to the CZ in about three seconds.

The Casio Programmer/Librarian doesn't do random patch generation, give graphic envelope displays, re-calculate total envelope time if you change a parameter, include free patches, or display envelope parameters in milliseconds instead of Arbitrary Casio Time Units. Also, at $129.95 you're paying close to half the price of a CZ-101 for the program alone. For these reasons, I strongly considered giving the program three stars instead of four. But the thing is easy to use, bug-free, well-documented, and frankly, it's the program I reach for when using the C-64 to program a CZ. It may not be the ultimate CZ patcher—we'll look at some Atari and Mac stuff in an upcoming issue—but it's unpretentious and gets to the core of what's important when programming a CZ.

—Craig Anderton

Sonus Casio Digital Disk ($75) ★★★★★

I've been listening to a *lot* of CZ patches lately. My general impression is that the imitative voices don't stack up so well next to analog synths or some DX-series stuff, but what the CZ does provide is its own unique sonic world. Of course, you do run out of possibilities eventually—this happens with any synthesizer—but within that context, there are many interesting effects to be found in the CZ.

The Sonus disk, programmed by G. Beall, contains 160 patches arranged as ten banks. Banks are not arranged according to any obvious plan, although some are heavier on a particular element (brass, strings, special effects) than others. Bank A has some good leads and several forceful sounds (good for rock). Bank B shows off some truly superb brass, although the strings and cellos are kind of weak. Bank C is another strong bank with lots of synth sounds. Bank D seemed like Mr. Beall was running out of steam—the flutes are anemic, although there are some nice FX and struck/plucked sounds. Bank E returns to form with some excellent examples of those famous CZ plucked sounds, and Bank F is sort of like the "Silly Screen" in Marble Madness—it contains mostly exaggerated and unusual patches. Bank G has a dose of both strong and delicate plucked sounds. Bank H has lots of special effects that I actually like (think I'll duck into the Programmer/Librarian's edit menu and learn a few new CZ programming techniques). Bank I seems to be the basses and bells bank; it has several New Age-type sounds you can throw behind melody lines. In Bank J we finally hit some good strings, plus some monster bass sounds that could inspire the first heavy metal CZ bass player.

What deserves five stars, in my mind, is that the disk provides a truly comprehensive repertoire of quality patches instead of a few absolute knockouts padded by "filler" patches (which often is the case with patch collections). You will need to do some editing to optimize sounds; you'll probably find the oft-used vibrato as annoying as I do and want to turn it down, and there is a bit too much release on some patches, which makes life difficult when pitch-bending lead lines. Still, the sheer number of highly useful patches in this collection make it especially recommended for the novice CZ player who wants to get into programming. While these patches work well by themselves, more importantly, they also provide an excellent point of departure.

—Craig Anderton

0-120 in 3.6 seconds

If you're interested in a high-performance synth, it's time to test drive an Ensoniq ESQ-1 Digital Wave Synthesizer. It puts 120 sounds at your fingertips as fast as you can switch it on and plug in a cartridge. But that's only the beginning.

In addition to standard synthesizer waveforms, the ESQ-1 features complex multi-sampled waves for a total of 32 waveforms on board. Each of the ESQ-1's 8 voices uses 3 digital oscillators with the ability to assign a different waveform to each oscillator. That's thousands of distinct sonic possibilities.

The ESQ-1 is simple to program because it lets you see what's really going on inside. Its 80-character lighted display shows ten programs or parameters simultaneously. So you'll spend less time writing down numbers and more time laying down music.

A built-in 8-track polyphonic sequencer makes the ESQ-1 an ideal MIDI studio. Each track can play internal voices, external MIDI instruments, or a combination of both. And each track can be assigned a separate program and MIDI channel. Like any good studio, the ESQ-1 can auto-correct timing, auto-locate passages and balance individual tracks during mixdown.

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If controlling other MIDI instruments is on your list of priorities, the ESQ-1 puts you in the driver's seat. It supports poly, omni and mono modes along with Ensoniq's multi and overflow modes that extend the MIDI capability of the ESQ-1 far beyond ordinary synths. You won't ever have to leave the comfort of its 61-note weighted, velocity sensitive keyboard to play any MIDI instrument in your setup.

Comparable high performance digital waveform synthesizers and MIDI sequencers can easily exceed the legal limits of your cash on hand. But the good news is that the ESQ-1 comes from Ensoniq—at a sane price of just $1395. For a glimpse of technology that's earned the name "advanced", put an ESQ-1 through its paces at your authorized Ensoniq dealer today.

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Although you should always fasten your seat belt when playing the ESQ-1, you don't have to wear a helmet or obey the 55mph speed limit. ESQ-1 and Mirage are trademarks of ENSONIQ Corp.

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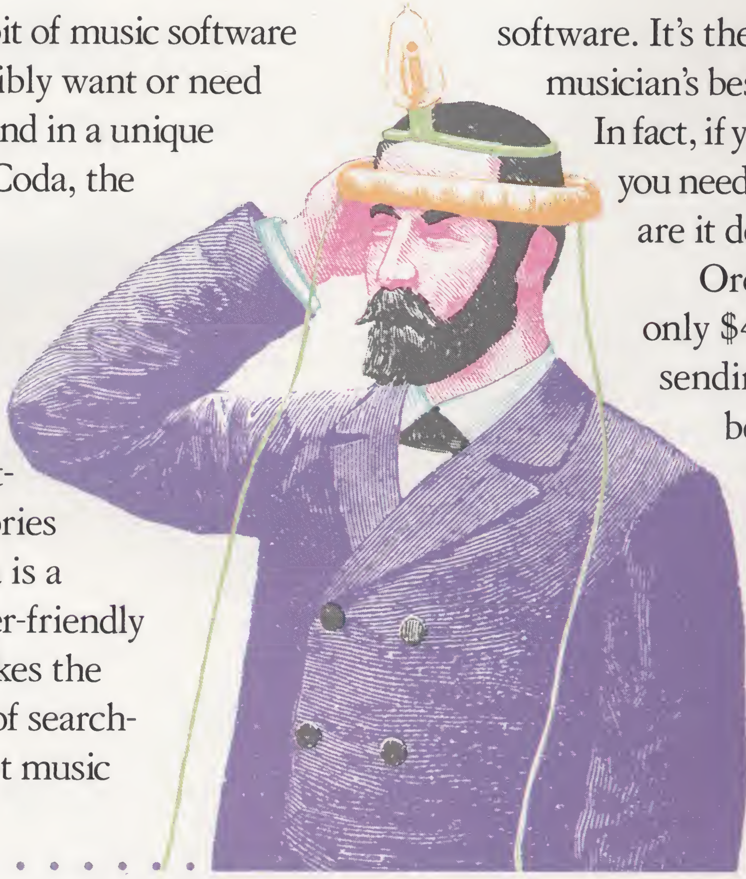

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Synthetic Productions Casio RAM Cartridges with Programs ($69.95)

Cartridge 1 (64 patches, Volumes I and II) ★★★

Cartridge 2 (64 patches, Volumes III and IV) ★★★★★

These RAM cartridges for CZ-series instruments hold 64 patches (four banks, considered as two volumes of two banks per volume) and come with voices programmed by Andrew Schlesinger. Each bank is selected by appropriately toggling two DIP switches located on the top of the cartridge. The cartridges seem mechanically sturdy, and include a battery for back-up. The big advantage to distributing patches on cartridge, of course, is that if you don't like some of the sounds you can always use the cartridge to store your own.

It's obvious that much time was spent on programming both cartridges. Cartridge 1 has some standout patches (good strings, in particular), and contains a wide variety of imitative voices. However, given my feeling (prejudice?) that imitative voices are what the CZ does least convincingly, it's probably not too surprising that many of these sounds, while workmanlike and of good quality, didn't necessarily excite me. Cartridge 2, however, is another matter altogether. Some of the voices (sound effects in particular) really stretch the CZ's capabilities and show off some interesting programming techniques. Also, many of the plucked strings, metallic sounds, and leads are exceptional. If I owned a jingle studio and wanted something I could just plug into a CZ and cover 80% of my needs without much additional tweaking, this cartridge would be my choice, especially since loading a cartridge into the CZ is easier than loading programs from disk into a computer and transferring them to the CZ. However, for the gigging rock musician who wants mostly stock sounds, Cartridge 1 would probably be a better option.

If you're in the market for a RAM cartridge, consider spending the extra few bucks required to get one with some pro voices already programmed in. These cartridges, especially Cartridge 2, are as good a place to start as any. —*Craig Anderton*

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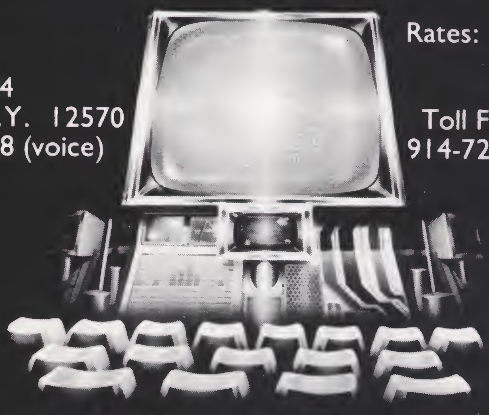

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Put those Atari ST MIDI ports to use with this useful, and simple, data storage program.

A Practical MIDI Application for the Atari ST

BY THOMAS BEUTEL

The Atari ST has been attracting the attention of many electronic musicians; not just because of its low price and Macintosh-like features, but more particularly, because of its built-in MIDI ports.

Programming a MIDI application on the ST is relatively easy. Most ST programming languages have a command that accesses the MIDI ports, and the ST operating system includes MIDI access utilities so it's not even too difficult to write MIDI routines in assembly language.

GrooveStore is a BASIC program for the Atari ST that saves and loads rhythm patterns for the Roland TR-707 drum machine. We're presenting it here both as an immediately useable TR-707 library and as a model to provide some BASIC ST tips for those of you who want to start writing your own MIDI programs on the ST. Look over Groovestore and the tips below, and you'll be on your way to writing applications for any MIDI device.

DOWN TO BASIC

Interactive BASIC is a great tool for learning the ins and outs of a new system. Being able to type in a short program, run it immediately, and then examine variables or peek into memory is a lot better than waiting for a program to compile and then finding out that it doesn't work yet. ST's menu driven BASIC has a good set of debugging commands: TRACEON, TRACEOFF, ON ERR, and Break points, and even allows you to follow the activity of variables while the program executes.

Of course, what you gain in ease of use and interactivity, you lose in speed. ST BASIC is an interpreted language. That is, it is not directly converted to machine code, but analyzed and executed, line by line, by an interpreter at run time. So not only do you lose speed with BASIC, but real time MIDI applications in BASIC are next to impossible. Real time stuff requires a compiler that will convert your program to lightning-fast machine code. Compilers are available for Pascal, C, and even BASIC (although they may not be compatible with ST BASIC).

> **"Programming a MIDI application on the ST is relatively easy"**

Although real time MIDI applications such as sequencers have timing requirements that ST BASIC can't meet, the language is great for an application that uses a computer's power to store and catalog preset or pattern data from one, or even several, MIDI instruments. Study the MIDI implementation chart that comes with an instrument to learn how it communicates with a computer.

THE TR-707

Though the Roland TR-707 can store patterns on standard tape cassettes, with GrooveStore the computer allows selecting a pattern without having to search for it on tape. The TR-707 communicates over the MIDI interface by use of special commands. It will respond to computer requests for data, or notifications that the computer is about to send data. The TR-707 responds by acknowledging the request or by sending an error message.

In addition to the usual MIDI implementation chart, Roland includes a complete description of pattern transfer via MIDI. All requests for data and the associated handshaking are performed with system exclusive commands. These commands are only understood by the TR-707, so you don't have to worry about confusing other MIDI machines that happen to be connected. The TR-707 has eight data transfer commands. Each starts with decimal value 240, telling everything that system exclusive data is starting. The next value, 65, is the code for Roland machines, so only Roland machines will pay attention to these commands. The next is an operation code defined by Roland that specifies what operation is about to take place. Then, more data follows, and/or the command ends with value 247 which tells everything that system exclusive mode has ended.

For an example of a typical MIDI conversation between the TR-707 and the computer, let's look at the command sequence that sends pattern data from the TR-707 to the computer. The computer first sends a 'Request File' command, telling the TR-707 that it wants the current patterns. The TR-707 responds with either a 'Rejection' if there was an error in transmission, or it sends the first block of data, consisting of 512 bytes plus a checksum. The TR-707 sends a 'Continue' command, telling the computer that there is more. Then the computer

---

***Thomas Beutel** became interested in electronic music while in high school and currently works as an IC product engineer in Silicon Valley. His MIDI studio consists of a Yamaha CX5M, Roland TR-707, Casio CZ-101, and Atari 520ST. Beutel is interested in reader feedback and can be reached through CompuServe (number 76367,433).*

responds with an 'Acknowledge' and more data is sent by the TR-707. The 'Data, Continue, Acknowledge' sequence is repeated for a total of 15 times, with the exception that the last data is followed by an 'End of File' command. The computer acknowledges and the TR-707 returns to its normal state.

I must commend Roland on the completeness of the manual that comes with the TR-707. It clearly describes the process of transferring data, and I had no problems implementing it. I wish more companies would include such information in their manuals, as it allows sophisticated users to make a more informed purchasing decision.

THE PROGRAM

The routine that actually receives and sends data is the easiest part of this program to write. The IN and OUT commands send to, and receive from, a variety of ports, including MIDI, which is

```
10    Rem TR-707 MIDI Rhythm Pattern
  Loader by Thomas Beutel
20    clear : fullw 2 : clearw 2 :
  defint a-z
30    rem Initialize midi
40    gosub 4000
50    dim midi(7700) : midi(0)=0 :
  fileadr# = varptr(midi(0))-1
60    rem Clear midi buffer
70    if inp(-3) <> 0 then junk =
  inp(3) : goto 70
80    print
90    print " (L)oad a pattern to
  TR-707"
100   print " (S)ave a pattern from
  TR-707"
110   print " (Q)uit"
120   print
130   input " Enter L, S, or Q";a$
140   if a$="L" or a$="l" then goto 1000
150   if a$="S" or a$="s" then goto 2000
160   if a$="Q" or a$="q" then goto 5000
170   goto 80
1000  rem Load a file to TR-707
1010  input " Name of rhythm pattern";
  filename$
1020  if len(filename$)>8 then print
  "Name must be 8 chars. or less" :
  goto 1010
1030  filename$ = filename$ + ".TR7"
1040  print " Loading"
1050  bload filename$,fileadr#
1060  print " Sending";
1070  rem Want to send a file
1080  out 3,240 : out 3,65 : out 3,80 :
  out 3,247
1090  index = 7695 : count = 4 :
  gosub 3000
1100  if midi(index - 1) <> 81 then
  print " error." : goto 60
1110  for k = 0 to 14
1120  rem Data
1130  out 3,240 : out 3,65 : out 3,82 :
  out 3,2
1140  print ".";
1150  j = k * 513
1160  out 3,64+k
1170  for i = 0 to 512
1180  out 3, midi(i+j)
1190  next i
1200  rem Continue or EOF
1210  out 3,247 : out 3,240 : out 3,65
1220  if k < 14 then out 3,84 else
  out 3,85
1230  out 3,247
1240  index = 7695 : count = 4 :
  gosub 3000
1250  if midi(index - 1) <> 83 then
  print " error" : goto 60
1260  next k
1270  print
1280  goto 60
2000  rem Save a file from TR-707
2010  rem Request a file
2020  out 3,240 : out 3,65 : out 3,81 :
  out 3,247
2030  index = -1 : print " Receiving";
2040  count = 3 : gosub 3000
2050  if midi(index) <> 82 then print
  " error" : goto 60
2060  count = 2 : gosub 3000
2070  index = 513*(midi(index)-64)-1
2080  print ".";
2090  count = 518 : gosub 3000
2100  if midi(index - 1) = 85 then
  goto 2140
2110  rem Acknowledge
2120  out 3,240 : out 3,65 : out 3,83 :
  out 3,247
2130  goto 2040
2140  rem Acknowledge
2150  out 3,240 : out 3,65 : out 3,83 :
  out 3,247
2160  print
2170  input " Name of rhythm pattern";
  filename$
2180  if len(filename$)>8 then print
  "Name must be 8 chars. or less" :
  goto 2170
2190  filename$ = filename$ + ".TR7"
2200  print " Saving"
2210  bsave filename$,fileadr#,15400
2220  goto 60
3000  rem Read input
3010  for i = 1 to count
3020  if inp(-3) = 0 then goto 3020
3030  index = index + 1
3040  midi(index) = inp(3) + 256
3050  next i
3060  return
4000  rem Adjust midi input buffer
  to 530 bytes
4010  dim buf(265) : bufadr# =
  varptr(buf(0)) : midbuf# = &ha00
4020  poke midbuf#, bufadr# : poke
  &hA04, 530
4030  return
5000  end
```

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defined as port 3. To send a system exclusive code, type 'OUT 3,240.' To receive MIDI data, first check the status of the input port by using a negative port value with the 'IN' command. If 'IN(-3)' is not zero, then there is MIDI data waiting in the input buffer. Then by letting a variable equal 'IN(3),' the variable will contain one MIDI value. An example of MIDI input can be seen in program line 3040. Notice that the value 256 is added to the input byte before it is stored in an array called 'midi().' This adjustment is necessary because inputs to the MIDI ports are received internally as negative values.

There are two main sections to GrooveStore, one starting at line 1000 that loads patterns and one starting at line 2000 that saves them to disk. A MIDI input subroutine at 3000 is called by the main sections and the rest of the program consists of initialization and getting user input.

The program starts at line 20 by clearing the screen and clearing and defining the variables as integers—clean slate time. Line 40 calls the subroutine at 4000 to expand the internal MIDI buffer from 128 to 530 bytes. The next lines create the array: 'midi()' to store the rhythm pattern and store its memory address for use by BSAVE and BLOAD. The program clears the MIDI buffer and asks you for an option.

LOADING

The program jumps to 1000, asks for a pattern name and checks its length. This name plus '.TR7' form the name on the disk. After BLOAD loads the pattern to the 'midi()' array, and OUT commands at 1000 tell the TR-707 the program is ready to send the pattern. While waiting for a response, subroutine 3000 checks the status of the input port, and places a specified number of input bytes into the 'midi()' array. Since the array is mostly occupied by a pattern, the input is put at the end of the array. Line 1090 sets the array index to 7695 and the count to 4, then calls the input routine at 3000.

After four bytes are received, the input routine returns with the array index pointing to the last byte. GrooveStore looks for a response to its request to send; if the next to last byte received was 81, everything was ok. The TR-707 now expects the pattern data to be sent.

Pattern data is sent by a loop at 1110. 1130 sends MIDI bytes telling the TR-707 that data is coming. Then 1160 sends a block number from 64 to 78 and 512 bytes of pattern data and a checksum that come straight from the array, exactly as they were received. The program does not actually check the checksum, so you may want to add this function. 1210 tells the TR-707 whether more data is coming and 1250 makes sure everything was correctly received.

The save routine is essentially the same as loading.

BASIC TRICKS AND TIPS

Although the program was easy to write, I had to resort to a few tricks to get it to work properly.

When I first wrote the program, I discovered it would only receive 128 bytes of MIDI data and lose anything over that amount. The TR-707 sends pattern data in 512 byte chunks. Since BASIC is interrupt-driven, it almost stops during this communication and can't empty the MIDI buffer fast enough. However, the buffer can be made larger and placed anywhere in memory if you DIMension an array to find its address. Assign that address to the MIDI buffer by POKEing the address to a system table at location &ha00 and POKE the buffer length (530 in this case) to location &ha04. This table contains more information about the MIDI buffer and other buffers, but this is all you need to know to make it work.

Another trick helped speed up the disk process. The typical way to SAVE arrays in BASIC is to print each array element one-by-one to the disk, but a SAVE took over 2.5 minutes. To solve this, I used BSAVE which writes the array directly to disk as binary data. Saving an array of 15400 bytes takes only 20 seconds. This works for BLOAD as well.

Using this program with the TR-707 is simple, but remember that communication is two way, so hook up both cables to the TR-707 and the ST. Set the TR-707 in MIDI sync mode and when its LEDs turn off during communication, that's good. If they don't come back on soon, that's bad and you'll have to reset the unit by turning it off and on.

So there it is, a complete MIDI application ready to run on the Atari ST. Of course, this is only a starting point for writing more powerful applications for the ST. You could eventually add menus and dialog boxes or combine several programs into one. The fewer buttons between you and your music, the better.

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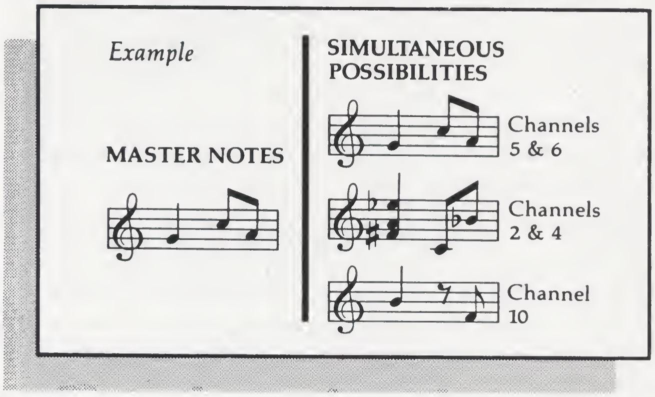
Any key or drum pad can be mapped to play any note or notes. Each note can be sent on its own combination of channels. Which means that you can have any number of layers and overlapping splits.



Example

MASTER NOTES

SIMULTANEOUS POSSIBILITIES

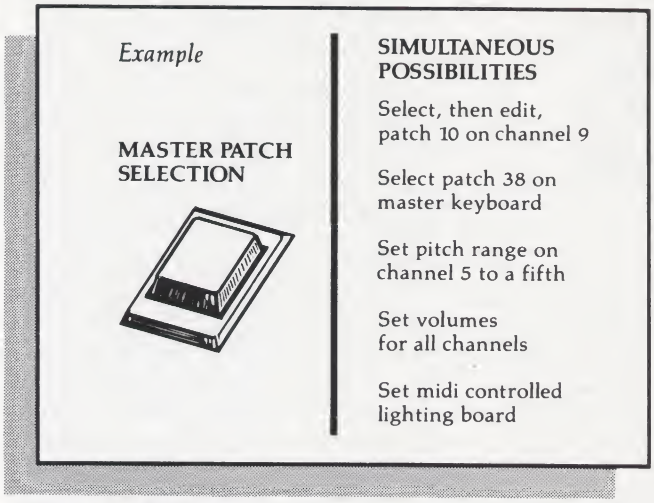
Channels 5 & 6

Channels 2 & 4

Channel 10

Performance Setup

The Mapper can send any midi messages on any channel at your command. That includes patch changes, control presets, and exclusive commands.



Example

MASTER PATCH SELECTION

SIMULTANEOUS POSSIBILITIES

Select, then edit, patch 10 on channel 9

Select patch 38 on master keyboard

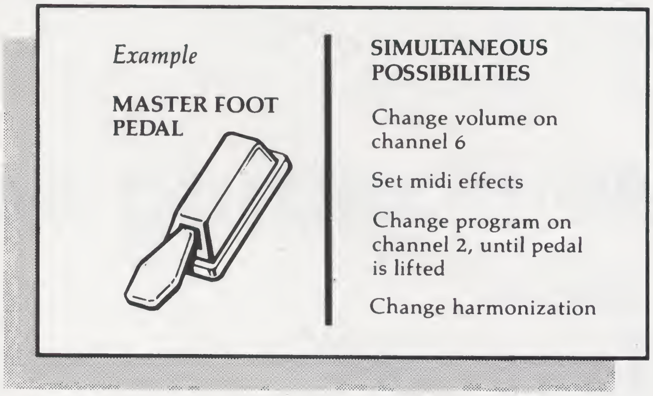
Set pitch range on channel 5 to a fifth

Set volumes for all channels

Set midi controlled lighting board

Switch Redefinition

Midi switches, such as the sustain pedal, can be assigned to any selected channels, or redefined to be any midi message. Notes can be used as switches.



Example

MASTER FOOT PEDAL

SIMULTANEOUS POSSIBILITIES

Change volume on channel 6

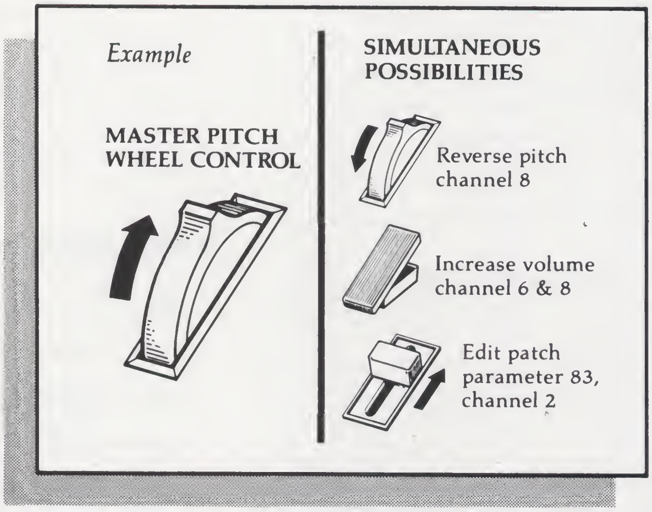
Set midi effects

Change program on channel 2, until pedal is lifted

Change harmonization

Cross Modulation

A master control (mod wheel, pitch wheel, after touch, breath, foot modulator . . .) can affect each of its several slave controls in dozens of ways. Master controls can also be used to change exclusive parameters.



Example

MASTER PITCH WHEEL CONTROL

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Edit patch parameter 83, channel 2

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Sequenced music doesn't have to sound mechanical. . . all it takes is a little thought, a little tweaking, and the tips in this article.

Humanizing Sequences

BY JIM JOHNSON

Back in the days of the original analog sequencers, when an 8-note memory was top of the line, the rugged pioneers of sequencing spent a lot of time playing with the parameters of both sequence and sound. Today, luxuriating in the auto-correctable lap of mega-memory as we do, the art of fine tuning a sequence until it actually becomes music suffers somewhat from neglect.

While new technology lets us build very thick arrangements in a short time, the result is often individual parts that are static and even machine-like. The automatic-weapons effect is appropriate and even desirable at times, but most pieces want at least a nominally human feel.

GET THAT FUNKY FEEL

The issue of humanizing sequencer lines was brought home to me recently when a friend played me some parts from a song in progress. The song itself was pretty good, and the voices fit the sequences pretty well, but it lacked something. After listening to the bass and drums for a while, I listed the bass sequence to the screen of his Dr. T sequencer and saw this:

```
SEQUENCE B                    99 REPEATS
MSR-ST TIME  CH  TYP   NOTE   VEL DUR

1-1      0    9  ON    G  3   64    8
1-37    36    9  ON    F  3   64    8
1-49    12    9  ON    G  3   64    8
1-85    36    9  ON    F  3   64    8
2-1     12    9  ON    G  3   64   24
2-37    36    9  ON    A  3   64   48
3-1     60    9  ON    G  3   64    8
3-37    36    9  ON    F  3   64    8
3-49    12    9  ON    G  3   64    8
3-85    36    9  ON    F  3   64    8
4-1     12    9  ON    D# 4   64   24
4-37    36    9  ON    D  4   64   48
5-1     60       DE
```

(By the way, here's how to interpret the Dr. T sequence listings we're using here. The first column lists the position of the event in measures and steps, where a step is one of the 96 clock pulses within the measure. An event with a value of 2-13 starts on the 13th clock pulse in the second measure, which at 24 pulses-per-quarter note is the second eighth note in the measure. The second column shows the *event time*, which is the number of clock pulses between the start of the previous note and the start of the current note. Ch is the MIDI channel over which the data appears, Type is the type of data, Note and Vel are the pitch and velocity values; Dur is the duration, or length, of the note.)

> **"The dynamics of a sequence are critical to achieving a life-like sound."**

The first thing I noticed was that all the event times were multiples of 12, indicating my buddy had autocorrected the part to eighth notes. This isn't necessarily bad, but the mathematical precision of an autocorrected part doesn't do much toward adding a human feel to the music. In this case, I tried "pushing" the accent notes (beats 1 and 3) by playing them slightly ahead of the drums. We shortened the time before each accent note by one clock pulse, then lengthened the time after these notes by one. The resulting sequence had a much more funky feel, which was what my friend was trying to achieve.

GETTING DYNAMICS ON NON-VELOCITY SYNTHS

The dynamics of a sequence are also critical to achieving a life-like sound. If your receiving synthesizer recognizes MIDI velocity, adding dynamics to a part is simple: edit the velocities of certain notes in the sequencer's MIDI stream. This might seem tedious, but it turns out that you can get good results by only changing a few critical notes—usually the rhythmically strong first or third beats of the bar.

Unfortunately, the CZ101 that we used to play this bass line doesn't recognize velocity, so we had to find another way to create our accents. The answer to this problem, surprisingly, came from the classic album *Switched On Bach*. In recording this album, Wendy Carlos added dynamics to her synthesized voices by using slightly different patches for individual notes, and then splicing these notes and phrases together to create a single instrumental part. With a multi-timbral synth like the CZ101, this task is reduced to a few keystrokes on the computer.

First, create a second version of the bass voice which is slightly louder and brighter (or maybe use a completely different patch—whatever makes you smile), and assign it to a MIDI channel adjacent to the first voice. Now change the channel number of the notes that you want accented to that of the new voice.

In between writing, programming, performing with his band girl:bike:dog, and writing software for Dr. T, ***Jim Johnson*** *occasionally finds time to eat and sleep. His original musical goal was to become a renowned Dixieland trumpet player; he modified his aspirations when his high school bought a PAiA modular synthesizer.*

Depending on the patches you use, the results can be either subtle or striking.

MORE TIMING TOUCHES

Another way to improve a static sequence is by changing the note durations. No musician plays every note exactly the same length, so a sequence with autocorrected durations will tend to feel "stiff." Vary the note durations as we did below, and you'll get a more natural motion.

SEQUENCE B 99 REPEATS

MSR-ST	TIME	CH	TYP	NOTE	VEL	DUR
1-1	0	9	ON	G 3	64	8
1-37	36	9	ON	F 3	64	5
1-49	12	9	ON	G 3	64	8
1-85	36	9	ON	F 3	64	5
1-96	11	10	ON	G 3	114	27
2-36	36	10	ON	A 3	84	45
3-1	61	9	ON	G 3	64	11
3-37	36	9	ON	F 3	64	6
3-49	12	9	ON	G 3	64	10
3-85	36	9	ON	F 3	64	5
3-96	11	10	ON	D#4	120	27
4-36	36	10	ON	D 4	90	44
5-1	61		DE			

What this all means is that the key to humanizing an autocorrected or computer-generated sequence is adding minor, controlled variations to the sequence.

> **"The answer to this problem, surprisingly, came from the classic album *Switched On Bach*"**

VARIATIONS ON A THEME

Further, in the same way that varying the accents and timing of a sequence can improve the phrasing of that part, varying the arrangement at the song level can improve the overall phrasing of the piece. Exactly what type of changes you make will depend on the capabilities of the sequencer, but in general, remember that almost any minor change you can make from one verse to the next will add life to the arrangement.

If you can control the tempo of your sequencer, try speeding up in the choruses and slowing down at the break (*small* changes!). With a sequencer that allows independent looping of multiple sequences, try leaving some parts out in different sections of the song, or changing the patch. If volume changes or velocity transpositions can be changed each time a sequence is called, do it.

Of course, this all reaches the point of diminishing returns eventually. In any decent sized work, there is an almost infinite amount of this detail work you can do, but good results can come from only a few variations.

As with any musical endeavor, practice makes perfect, so don't worry if all this work seems tedious at first. The difference it will make in your music is subtle, but is a big step towards eliminating "sequencer fatigue" in your audience. EM

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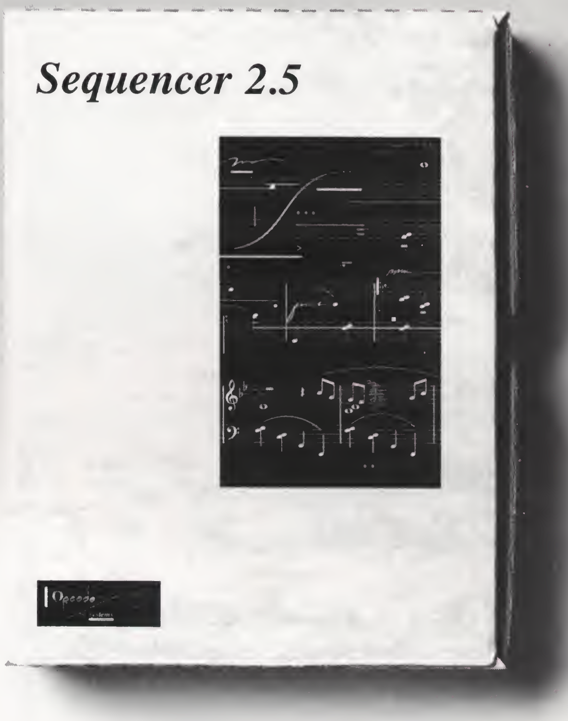

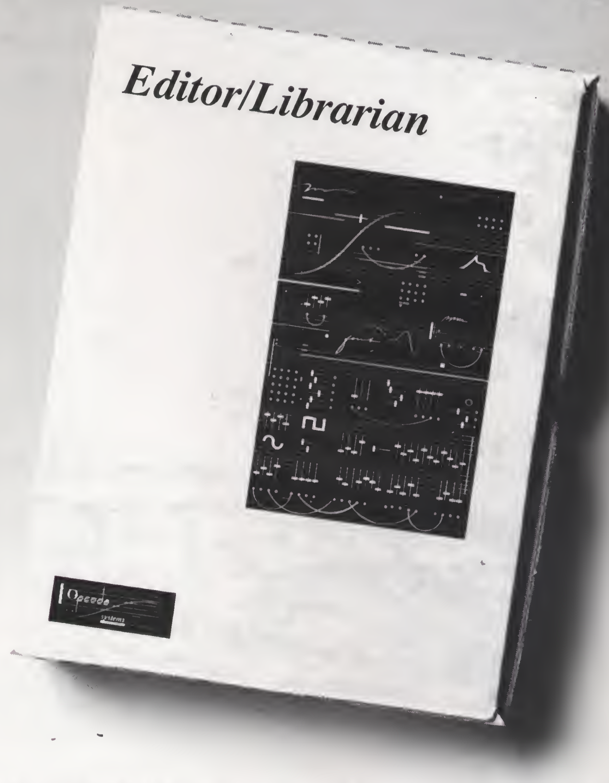

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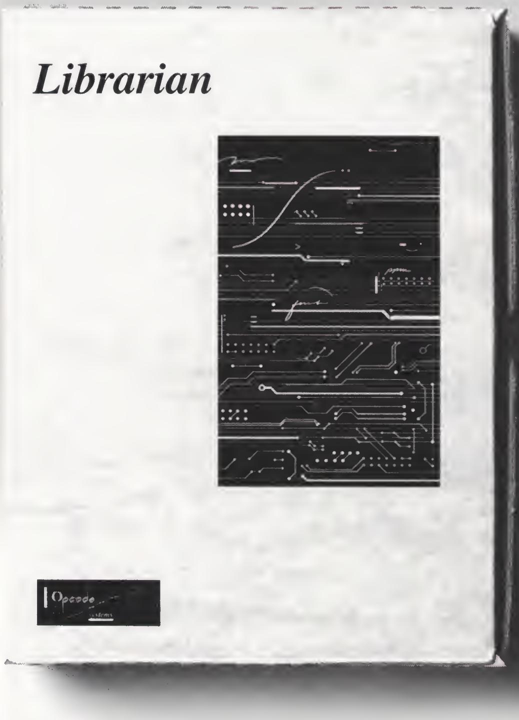

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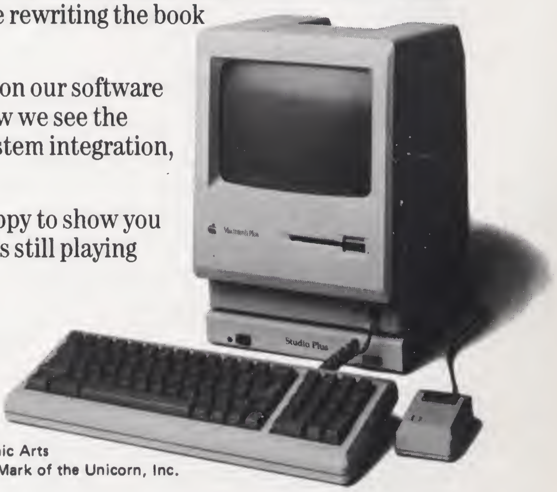

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Are you just starting to form a meaningful relationship with your software? Here are ten tips that will help the process.

Ten Software Tips

BY CRAIG ANDERTON

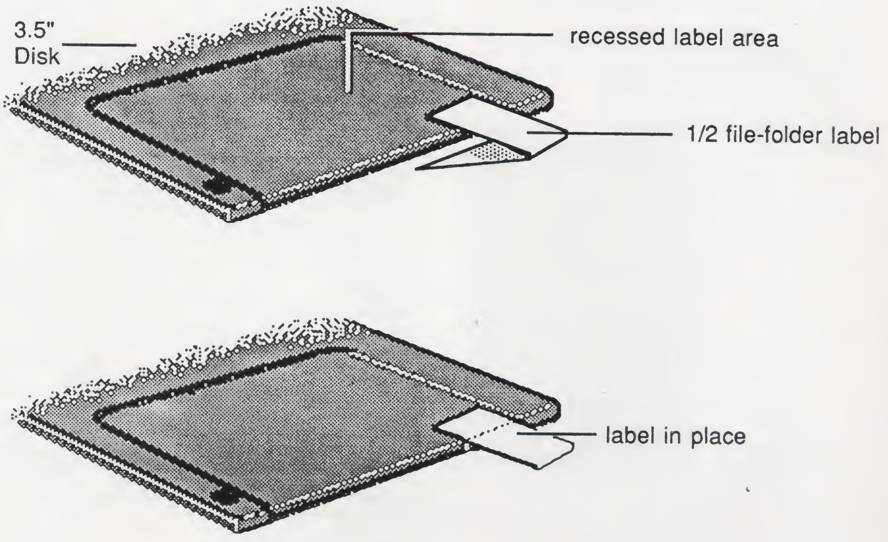
While music software is less of a novelty than it was a few years ago, some musicians are still not comfortable with chips 'n disks. This article, then, will present tips—from the obvious to the subtle—designed to make life with music software more pleasant.

1. *Send in your warranty.*
This is important! Whether companies like to admit it or not, most software programs are works-in-progress, and updates are often issued in order to correct bugs and other problems. Many companies will inform registered owners of these updates, and offer them at a nominal fee.

2. *You can experiment as much as you want as long as the disk is write-protected.*
During the first few weeks I have a program, if I'm doing anything important I keep the disk write-protected (unless, of course, I need to save something). Then, even if I make some catastrophic error, I'm safe.

3. *Mark up your manual.*
Buy two differently colored highlight pens. When updates occur, use one color to block out sections that are no longer true. Use the other highlight pen to accent important tips that are "buried" in the manual (most manuals are poorly indexed, and highlighting important features can help you locate parts more rapidly).

4. *Software needs to be practiced.*
Like music itself, music software has subtleties and complexities that are not immediately obvious and require practice to master. Never use a new software program on an important project unless you have practiced with the program steadily for at least a few weeks.



5. *Save your work frequently.*
This should be obvious, but I'll keep saying it until I stop hearing stories of musicians who lost hours of work because they didn't save. The rule is simple: whenever you've done enough work that you would hate to lose it, *save!*

6. *Identify your disks properly.*
It's no good saving something to disk if you can't find it. Keep a log of your disks, and label all disks. When writing on the label of a 5.25-inch floppy, use only a felt tip pen—anything else can damage the disk. Or, write on a label which you affix to the disk. For 3.5-inch disks (and 5.25-inch floppies too), **EM**'s Mac artist extraordinaire, Chuck Dahmer, has a great trick: take a file folder label, fold it back on itself, and stick it on the disk as shown in **Fig. 1**. This makes it very easy to identify a disk while it's in the drive (as well as when it's in a disk case).

7. *You can often get away with single-sided disks in double-sided applications.*
Sure, the manual says to use double-sided, double-density (DSDD) disks...and that's certainly the recommended way to do things. But if a single-sided disk formats correctly in a double-sided drive, it may be able to do the job of a DSDD type for a lower price. Use these disks for non-critical applications, but of course, also buy some of the best disks you can afford when you need to make copies of important material. Case in point: the Emulator II pushes disk drive performance to the limit, yet out of 200 surplus disks I bought for 10 cents each, only four didn't format (so I didn't use them) and despite pretty heavy use, only one disk has failed over the years (which could have happened to even an expensive disk). Although disk manufacturers warn that using the wrong type of disk can

damage the drive, my experience as well as the experience of some other computer owners is that a quality disk is a quality disk—whether single- or double-sided. Do, however, avoid disk prices that are too good to be true; counterfeit disks exist, so stick with reputable brands and distributors. Also, note that I disclaim all responsibility if following this advice causes you to lose some important data (maybe I've just been lucky), so proceed at your own risk.

8. *If you're a mouse jockey, learn the keyboard equivalent commands.*

Most mouse-driven programs also allow for commands entered via the keyboard. While less intuitive, these are often faster and more efficient to use. Speaking of mice, I saw a great tip in *AmigaWorld:* there's no need to use an expensive mouse pad when a plastic dining room table placemat will also do the job.

9. *Remove the keycaps from the "crash" keys.*

Sometimes hitting a key such as Restore or Reset will reset the computer or cause some other catastrophe. With many computer keyboards, you can minimize the chance of these kinds of accidents by removing strategic keycaps. Pry up *gently* on each corner of the keycap (pry up one corner a tiny bit, then the next corner, then the next, and so on) using a cloth-covered screwdriver blade. If you encounter any significant resistance, *do not proceed.* Just in case, practice on a key you don't use much. Once you figure out how to remove one keycap, it's easy to do the rest. With the keycap removed you can still access the key if necessary, but it won't be quite so easy to hit by accident.

10. *If you're handy with a soldering iron, add a footswitch in parallel with the control key.*

Find the two connections that go to the control key switch, and hook these up to a footswitch. Use two-conductor shielded cable and keep the cable length as short as possible. For programs with multiple-keystroke commands, using a footswitch can speed up operation and reduce keystroke errors.

So there are the ten tips. If you come up with any more, send 'em in to EM!

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Looking for a Casio Patch Librarian? If you have the EM MIDI interface, or a Passport-compatible interface for that matter, you can program your own.

CZ Patch Librarian

BY TIM DOWTY

If you've been putting off building the EM MIDI Interface card for your Commodore-64 (presented in the May '86 issue), here's another reason to get on the stick and start soldering: a patch librarian program for the Casio CZ-101. If you've been cursing the 101's limited program storage, wishing for a painless way to move patch data from one CZ to another, or if you just want to learn more about programming computers for MIDI, read on.

As it's written, the CZ Patch Librarian allows you to move CZ patch data back and forth over MIDI, save the data to floppy disk, and retrieve previously saved data from the disk. It requires a Commodore 64 (or C-128 in C-64 mode), a 1541 or 1571 disk drive, the EM MIDI Interface card, and a Casio CZ-series synth. If your particular hardware setup doesn't match this configuration and you're ready to tackle some assembly language programming, it is possible to modify the program to run with your specific equipment (and this would be a great "learn-by-doing" exercise). In fact, if you have a Passport (or compatible) interface card, but all your other equipment matches our requirements, the program modifications are already done—see the sidebar for the changes. (This one was so easy that I couldn't pass it up!)

PROGRAM OVERVIEW

The CZPL program is written in both BASIC and 6510 assembly language. "Why two languages," you may ask. "Why not write the whole thing in BASIC?"

Here's the answer. Many times BASIC is convenient and easy to use (for small programs anyway) and its shortcomings can be overlooked. But in "real time" applications, the computer has to react quickly to brief events such as the arrival of MIDI bytes. With the speed you need for real time stuff, BASIC isn't even in the ballpark.

On the other hand, assembly language (AL) is great for real time tasks. AL coding results in the fastest possible execution times and as a bonus gives us the highest possible control over the computer's operation. But as always, there's no free lunch in the land of computer programming, and we pay a price for AL's speed and boundless flexibility. AL forces us to concern ourselves with all kinds of hairy little programming details that BASIC has always taken care of quietly and automatically.

For example, the AL equivalent of a simple BASIC statement like "PRINT" can suddenly take on major proportions—pre-loading registers, converting variables you want to print from hexadecimal to decimal, setting up pointers to ASCII strings, and so forth.

Yet in spite of their differences, BASIC and AL complement one another very well. The CZPL program takes advantage of this by letting each of the two languages do what it does best. While BASIC is responsible for the non-time-critical stuff—the screen menus, the user input, and the disk I/O (Input/Output)—AL takes care of the hardcore, real-time MIDI I/O. If you're a regular reader, chances are that the bilingual BASIC/AL approach isn't new to you; this particular "divide and conquer" scheme is the same one used by my MIDI Echo/Delay program (August '86 issue).

THE TWO FACES OF MIDI

Now with an overview under our belts, we're about ready to peek into the details of the patch librarian program. But before we take a more in-depth look at CZPL, we need to re-examine the MIDI specification in terms of CZPL's specific requirements.

To begin with, there are actually *two* MIDI standards. More accurately, MIDI has two distinct sets of standards: one for hardware and one for software.

In the "Build the EM MIDI Interface" article, we turned the spotlight on the

Program Changes for Passport, Syntech, and Compatibles

To make the CZPL program run with a Passport, Syntech, or compatible MIDI interface card, make the following seven changes to the code shown in Listing 1.

1. Line 105: change "IF CSM%<>174" to "IF CSM%<>188"
2. Line 50110: change the tenth data byte from "00" to "08"
3. Line 50110: change the 15th data byte from "00" to "08"
4. Line 50140: change the fifth data byte from "02" to "08"
5. Line 50140: change the 12th data byte from "03" to "09"
6. Line 50150: change the first data byte from "02" to "08"
7. Line 50150: change the ninth data byte from "01" to "09"

***Tim Dowty** has worked as a guitarist with the San Diego-based synth trio "Elemental P," as well as done software design for Inter-Ocean Systems. He consults on MIDI and related topics, and, through his company Xerbitron, manufactures a line of low-cost MIDI project kits for electronic musicians.*

hardware half of the standard. Our main concerns there were the low-level mechanics of sending and receiving data according to MIDI's hardware rules—31.25 Kbits/sec, 8 data bits, one start and one stop bit, etc. The whole point was simply to transform the parallel data at the C-64's expansion port into a MIDI-compatible, serial data stream.

Meanwhile, back at the software ranch, it was the job of "ASCII-Synth," the sample BASIC program that accompanied the article, to take care of the "software interfacing" chores. That is, to hand over (to the hardware) data that would make sense to the MIDI instruments down the line.

As you probably know by now, the ASCII-Synth listing had a fatal error in line 150. (See Error Log in the July '86 issue for corrections.) The uninitialized variable, SOUND, was used instead of SPEAK, the variable that held the value of the MIDI note-on byte. Since Commodore BASIC sets all uninitialized variables to zero, the data sent out by ASCII-Synth was meaningless to MIDI, and all your synths sat there mute.

My apologies for the error. To paraphrase a fellow **EM** author: when it comes to mistakes, there's nothing quite as satisfying as being able to say, "I made them myself!"

But I think this particular cloud may have the proverbial silver lining. This software goof-up serves to illustrate the difference between the two halves of the MIDI spec quite nicely. A MIDI synth couldn't have possibly responded as we wanted with the original ASCII-Synth program running, even if the interface card had worked perfectly. The problem with our setup was that data being sent out by ASCII-Synth didn't meet specs of the software half of the MIDI spec—our *data* wasn't MIDI compatible. (This is a perfect example of the expression, "garbage in, garbage out.") As soon as the software is fixed (as shown in Error Log), the program works as it's supposed to.

With the grungy hardware considerations out of the way (are my prejudices showing through?), we can now get to the fun stuff: controlling the meaning of the *information* the MIDI bytes convey.

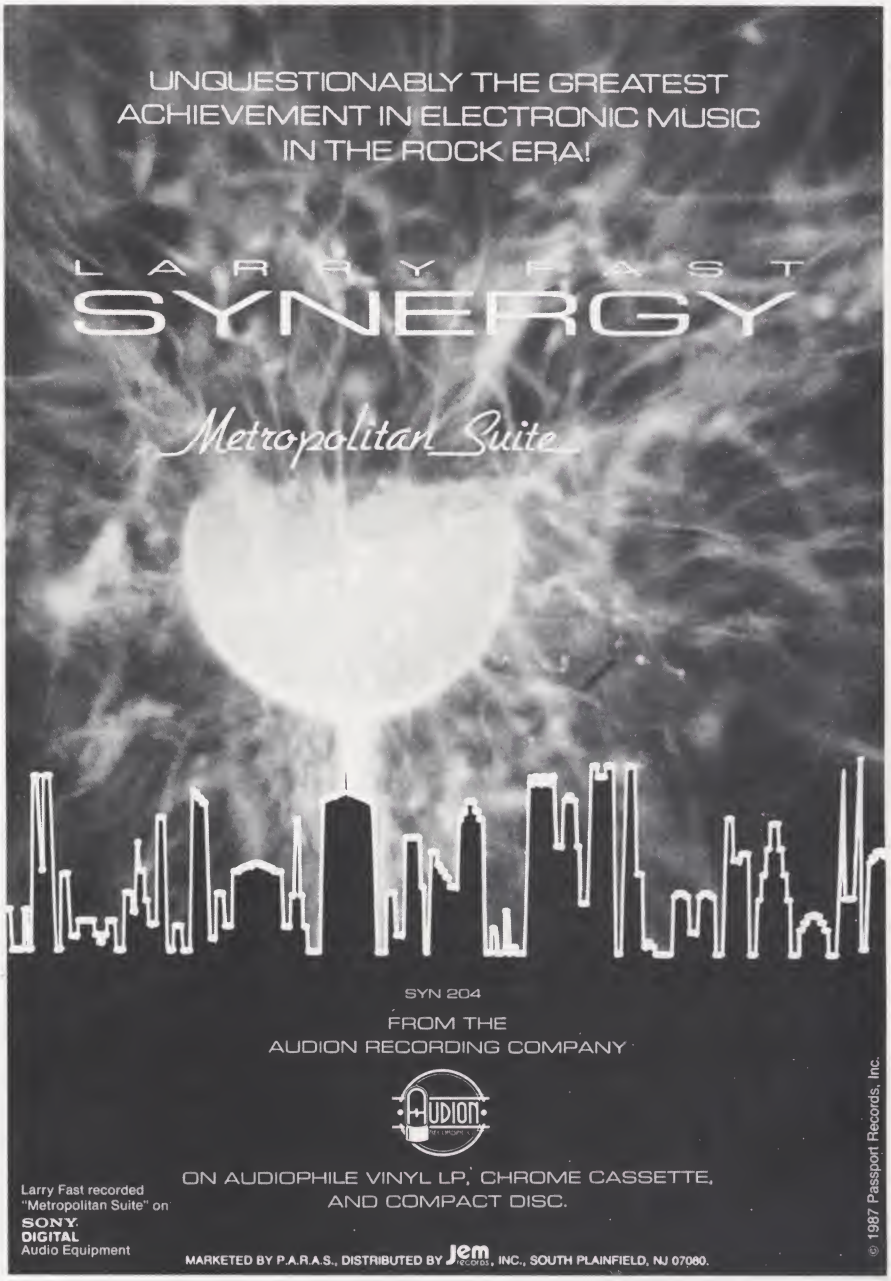
MIDI MESSAGES

As most of you MIDI fanatics know, just as words transit meaning among people, certain patterns of MIDI bytes "mean" something to MIDI instruments. For example, the three hexadecimal bytes $90 $3C $7F mean: "Key down on channel one, middle C, maximum velocity."

This kind of MIDI information is known as a Channel message. In the example above, all MIDI listeners set to respond to channel one only will act on the message, while those set for other channels only will ignore it. As you would expect, Channel messages make up the lion's share of MIDI activity.

Another useful class of MIDI messages is called System Real Time. Real Time messages differ from Channel messages in that Real Time messages are to be acted on by *all* instruments listening to the bus, regardless of the channel(s) to which they are set. Timing-Clock-In-Play (popularly called "MIDI Clock") is a good example of a System Real Time message, since it drives all timing-sensitive instruments and therefore allows them to all follow the same system-wide timing reference.

A third class of MIDI messages—and this is the one that the CZPL is concerned with—is System Exclusive.



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MIDI SYSTEM EXCLUSIVE

System Exclusive (Sysex) messages work a lot like Channel messages in that both are intended only for a certain subgroup of synths. In the case of Channel messages, the subgroup is defined by the *channel* over which the information is sent. (Information sent over channel one, for instance, is ignored by all synths except those set to receive channel one.)

Sysex puts a little twist on this idea: here the criterion for subgroup selection is the *manufacturer* of the synth. Sysex sends out a special byte that means: "The following stuff is for Yamaha (for example) synths only." **Fig. 1** mentions a few well-known manufacturers and their corresponding ID bytes as issued by the MIDI standards committee.

In effect, System Exclusive (Sysex) allows a computer or synthesizer to take over the MIDI line and use it for its own purposes. Sysex is principally used to move patch data and digitized sound data, but *any* sort of data transfers can take place over MIDI under Sysex, as long as it follows Sysex's rules.

As shown in **Fig. 2**, there are three main parts to a MIDI System Exclusive "session":

1. The MIDI transmitting device (the "talker") sends the System Exclusive command byte, followed by the manufacturer's ID byte.
2. The actual Sysex data transfer takes place. This transfer can consist of one byte or a zillion bytes; Sysex doesn't care. The only restriction on the Sysex data is that the most significant bit (D7) of each byte must be at logic level low.
3. Third, the "talker" signals the end of the Sysex data exchange by sending an $F7. This restores normal MIDI operation, and any non-selected manufacturer's equipment again responds to MIDI information.

THE PROGRAM

Listing 1 shows CZPL, a Commodore-64 BASIC program. The program is too long to discuss details of its operation, but let's take a quick overview and hit a few of the high points. (Note: if you would like a fully-commented listing of the assembly language portion of this program and have a U.S. postal address, send $3.50 and a standard letter-sized, self-addressed envelope stamped with 39 cents postage to: Xerbitron, P.O. Box 70055, San Diego, CA 92107.)

Manufacturer	**ID Byte (hex)**
Sequential Circuits	$01
Big Briar	$02
Octave/Plateau	$03
Moog Music	$04
Passport Designs	$05
Lexicon	$06
Kurzweil Music System	$07
CBS Musical Instruments	$08
Steinway & Sons	$09
Oberheim Electronics	$10
Bon Tempi	$20
S.I.E.L.	$21
Kawai	$40
Roland	$41
Korg	$42
Yamaha	$43
Casio	$44

Fig. 1 *Manufacturers' System Exclusive Identification Bytes (partial list)*

BASIC program lines 10-99 set variables to their initial values and perform a few "housekeeping" tasks. Lines 10 and 90 are of particular interest. Line 10 sets the top of BASIC memory and BASIC string storage to address $8000; this prevents machine language data, to be POKEd in later, from overwriting anything stored here. Line 90 will be covered a little later.

Lines 100-999 comprise the "main" program that coordinates all activity by calling subroutines, etc. The first chunk of the main program, lines 100-190, prints a sign-on message, POKEs the machine language data, performs a checksum test on the POKEd data and then presents a menu of options. Depending on the user's selection, the first chunk passes control to either the save section ("S" option), the load section ("L" option) or the quit section ("Q" option).

THE SAVE SECTION

The save section lives in lines 400-599. As before, it displays an option menu, but this time the user selects which of the CZ's 16-voice memory banks should be saved to disk. In line 500, the base program number of the save bank (in variable SB%) is POKEd into a special location in the machine language data. Then line 510 calls the machine language save routine, which retrieves the 16 sets of program data from the CZ via the MIDI System Exclusive protocol, and puts the data into the C64's memory starting at location $8800. This routine also displays the number of each synth program (in hex) as it's being retrieved.

The two lines following the save routine's return are a little odd, but necessary. On the first try, I would often find fewer bytes than I expected in my received patch data. These lines simply check a byte count kept by the machine language routine, and if a discrepancy is found, call the save routine again.

The rest of the BASIC save section prompts the user and accepts a file name for the disk data file. Control then passes to the subroutine at line 5000 where the patch data stored in the C64 memory is written to the disk.

If a disk error occurs upon opening the disk file (file already exists, disk not in drive, etc.), an error flag is set and the subroutine immediately closes the file

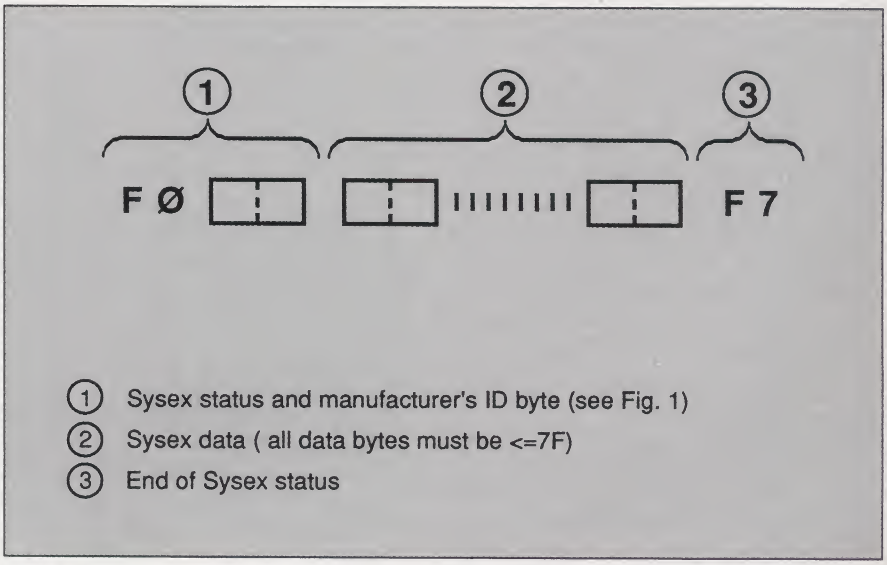
1
2
3
F 0
F 7
① Sysex status and manufacturer's ID byte (see Fig. 1)
② Sysex data (all data bytes must be <=7F)
③ End of Sysex status

Fig. 2 *The three components of a system exclusive "session" (numbers in hexidecimal)*

and returns. Otherwise, the data is written normally before the file is closed and the subroutine returns.

Before we leave the disk write subroutine, lines 5020 and 5030 deserve special mention. These lines precede the patch data with a two-byte memory address, allowing us to play a little trick on the C-64 operating system. The address that's written is the location where the patch data will begin loading when it's read back from the disk (via the restore option). This lets us load the patch data file later as a program file—the C64's fastest-loading file type.

Upon returning from the disk write subroutine, if there has been a disk error, the save section takes care of error handling and then jumps back to display the main menu.

THE RESTORE SECTION

Lines 600-799 implement the restore section. Most of this is a duplication of the save stuff above, except that line 735 positions the cursor for the machine language program number display. We have to do the disk-related code before calling the machine language routine in line 750.

We can now address that mysterious line 90 referred to earlier. Since we're loading the patch data from the disk as though it were a BASIC program, we've got to play by the Commodore BASIC rule that says: If LOAD is executed from within a program, the newly LOADed program is RUN. Normally this is what you want, since this feature allows programs to be "chained" (one BASIC program invoking a second BASIC program which in turn invokes a third BASIC program . . .).

However, with the patch librarian, since we're LOADing the data to someplace in memory other than the normal BASIC program area, the patch librarian program itself gets RUN from the start since it is in the normal BASIC area.

Before the file is LOADed, the disk read subroutine (lines 6000-6999) sets the variable TMP to 1 as a signal to line 90's logic. When the program is restarted, line 90 will catch the new value of TMP and pass control back to line 745, just as though we'd performed a normal RETURN from the disk read subroutine.

THE QUIT SECTION—AND BEYOND

No tricks in the Quit section. Selecting the "Q" option passes control to line 999, which simply clears the screen and ends the program.

If you're up for some computer programming, there's lots of gold to mine beyond the raw CZPL program. Just be sure to save an unaltered copy of the program in a safe place before you begin making changes.

In the BASIC section, see about adding some color to the menu screen so the program isn't so drab-looking. You could also try making the program more fun to use, and there have *got* to be some ways to speed up the disk saves.

The AL section could also use some refinements; here are some suggestions:

✓ If there's no synth connected to the interface card, or if a connected synth isn't powered on, the program hangs. This really ought to be fixed.

✓ I'm sure that the disk I/O times could be significantly reduced from AL.

✓ What can you do with the patch data once it's in the C-64's memory? How about a patch editor that uses hi-res graphics? Programming patches with a light

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```
1 REM *********************************
2 REM *    CZ-101 PATCH LIBRARIAN     *
3 REM *                               *
4 REM *          05/26/86             *
5 REM *-------------------------------*
6 REM *    (C)1986 BY TIM DOWTY       *
7 REM * ALL COMMERCIAL RIGHTS RESERVED*
8 REM *********************************
9 REM
10 POKE 51,0:POKE 52,127:POKE 55,0:POKE 56,127
15 C$=CHR$(147):Z$=CHR$(18)+"CZ-101 PATCH LIBRARIAN"+CHR$(146)
17 AU$="BY TIM DOWTY"
20 RQ$="(REQUIRES EM INTERFACE CARD)"
30 S$="[S]AVE PATCHES TO DISK":R$="[R]ESTORE PATCHES TO SYNTH":Q$="[Q]UIT"
40 P$="[P]RESET":I$="[I]NTERNAL":K$="[C]ARTRIDGE":F$="DISK FILE TO RESTORE"
50 W$="SAVE PATCHES ON DISK":WW$="UNDER WHAT NAME":L$="LOADING MACHINE CODE..."
60 Y$="YOUR CHOICE [?]"
70 SV=32771:LD=32774
80 DS=34816:DE=DS+4096
90 IF TMP=1 THEN 745
99 REM
100 GOSUB 1000:PRINT TAB(5);L$:GOSUB 2000:GOSUB 4000
105 IF CSM%<>174 THEN PRINT:PRINT"CHECKSUM ERROR! CHECK MACHINE CODE.":END
110 GOSUB 1000:PRINT TAB(5);S$
120 PRINT:PRINT TAB(5);R$
130 PRINT:PRINT TAB(5);Q$
140 PRINT:PRINT:PRINT Y$;
150 GET A$:IF A$="" THEN 150
160 IF A$="S" THEN 400
170 IF A$="R" THEN 600
180 IF A$="Q" THEN 999
190 GOTO 110
400 GOSUB 1000:SB%=-1
410 PRINT TAB(5);P$
420 PRINT:PRINT TAB(5);I$
430 PRINT:PRINT TAB(5);K$
440 PRINT:PRINT:PRINT"BANK TO SAVE [?]";
450 GET A$:IF A$="" THEN 450
460 IF A$="P" THEN SB%=0
470 IF A$="I" THEN SB%=32
480 IF A$="C" THEN SB%=64
490 IF SB%<0 THEN 400
500 POKE 32783,SB%
510 SYS SV
515 IF PEEK(253)<>16 THEN 500
517 IF PEEK(254)<>152 THEN 500
520 GOSUB 1000
530 PRINT TAB(5);W$
540 PRINT:PRINT TAB(5);WW$
550 PRINT:PRINT TAB(5):INPUT FF$
555 IF FF$=" " THEN 110
560 GOSUB 5000
570 IF ER=1 THEN GOSUB 7000:GOTO 110
599 GOTO 110
600 GOSUB 1000:SB%=-1
620 PRINT:PRINT TAB(5);I$
630 PRINT:PRINT TAB(5);K$
640 PRINT:PRINT:PRINT"BANK TO RESTORE [?]"
650 GET A$:IF A$="" THEN 650
670 IF A$="I" THEN SB%=32
680 IF A$="C" THEN SB%=64
690 IF SB%<0 THEN 600
700 POKE 32790,SB%
710 GOSUB 1000
720 PRINT TAB(5);F$
730 PRINT:PRINT TAB(5):INPUT FF$
735 PRINT TAB(8+LEN(FF$));CHR$(145);
740 GOSUB 6000
745 IF ER=1 THEN GOSUB 7000:GOTO 110
750 SYS LD
799 GOTO 110
999 PRINT C$:END
1000 REM ******************************
1001 REM * SUB CLEARS SCREEN, PRINTS  *
1002 REM * SIGN-ON MESSAGE & POSITIONS*
1003 REM * CURSOR.                    *
1004 REM ******************************
1010 PRINT C$:PRINT:PRINT TAB(8);Z$:PRINT:PRINT TAB(14);AU$
1020 PRINT:PRINT TAB(6);RQ$
1030 FOR I=0 TO 6:PRINT:NEXT I
1999 RETURN
2000 REM ******************************
2001 REM * SUB POKES MACHINE LANGUAGE *
2002 REM * CODE INTO RAM.             *
2003 REM ******************************
2010 SADRS=32768:EADRS=33024
2020 FOR I=SADRS TO EADRS
2030 READ OP$:GOSUB 3000
2040 POKE I,OP
2050 NEXT I
2999 RETURN
3000 REM ******************************
3001 REM * SUB CONVERTS STRING IN DATA*
3002 REM * STATEMENT TO POKE-ABLE     *
3003 REM * DECIMAL NUMBER.            *
3004 REM ******************************
3010 OH$=LEFT$(OP$,1):OL$=RIGHT$(OP$,1)
3020 OH=VAL(OH$):IF OH=0 AND OH$<>"0" THEN OH=ASC(OH$)-55
3030 OL=VAL(OL$):IF OL=0 AND OL$<>"0" THEN OL=ASC(OL$)-55
3040 OP=OH*16+OL
3999 RETURN
4000 REM ******************************
4001 REM * SUB CALCULATES CHECKSUM OF *
4002 REM * POKED MACHINE CODE.        *
4003 REM ******************************
4010 CSM%=0
4020 FOR I=SADRS TO EADRS
4030 CSM%=CSM%+PEEK(I)
4040 I=I+1
4050 CSM%=CSM%-PEEK(I)
4060 NEXT I
4999 RETURN
5000 REM ******************************
5001 REM * SUB WRITES DATA TO DISK.   *
5002 REM ******************************
5010 CLOSE 15:OPEN 15,8,15:OPEN 1,8,1,FF$+",P,W"
5015 GOSUB 10000
5016 IF ER=1 THEN 5070
5020 PRINT#1,CHR$(DS-INT(DS/256)*256);
5030 PRINT#1,CHR$(DS/256);
5040 FOR I=DS TO DE
5050 PRINT#1,CHR$(PEEK(I));
5060 NEXT I
5070 CLOSE 1:CLOSE 15
5999 RETURN
6000 REM ******************************
6001 REM * SUB READS DATA FROM DISK.  *
6002 REM ******************************
6010 CLOSE 15:OPEN 15,8,15:OPEN 1,8,0,FF$+",P,R"
6020 GOSUB 10000
6025 IF ER=1 THEN 6070
6030 CLOSE 1:TMP=1
6040 LOAD FF$,8,1
6070 CLOSE 1:CLOSE 15
6999 RETURN
7000 REM ******************************
7001 REM * SUB GETS A KEY AFTER DISK  *
7002 REM * ERROR.                     *
7003 REM ******************************
7010 PRINT:PRINT TAB(5);"HIT A KEY TO CONTINUE..."
7020 GET A$:IF A$="" THEN 7020
7999 RETURN
10000 REM ******************************
10001 REM * SUB READS DISK ERROR CHAN.*
10002 REM * AND, IF ERROR, PRINTS     *
10003 REM * ERROR MESSAGE AND SETS    *
10004 REM * ERROR FLAG (ER).          *
10005 REM ******************************
10010 ER=0:INPUT#15,AA$,BB$,CC$,DD$
10015 IF VAL(AA$)<20 THEN 10999
10020 PRINT:PRINT TAB(5);CHR$(18);BB$;CHR$(146):ER=1:CLOSE 15
10999 RETURN
50000 REM ******************************
50001 REM * MACHINE LANGUAGE OP CODES *
50002 REM ******************************
50010 DATA 4C,A6,80,4C,17,80,4C,38,80,F0,44,00,00,70,10,00
50020 DATA F0,44,00,00,70,20,20,20,A6,80,20,59,80,AD,0F,80
50030 DATA 20,EB,80,A9,9D,20,D2,FF,A9,9D,20,D2,FF,EE,0F,80
50040 DATA AD,0F,80,29,0F,D0,E3,60,20,A6,80,20,86,80,AD,16
50050 DATA 80,20,EB,80,A9,9D,20,D2,FF,A9,9D,20,D2,FF,EE,16
50060 DATA 80,AD,16,80,29,0F,D0,E3,60,AD,03,DE,A2,09,A0,80
50070 DATA A9,07,20,C2,80,20,B9,80,A9,70,20,DE,80,A9,31,20
50080 DATA DE,80,A2,00,20,D3,80,81,FD,E6,FD,D0,02,E6,FE,C9
50090 DATA F7,D0,F1,4C,DE,80,A2,10,A0,80,A9,07,20,C2,80,20
50100 DATA B9,80,A2,00,A1,FD,20,DE,80,E6,FD,D0,02,E6,FE,C9
50110 DATA F7,D0,F1,4C,D3,80,A9,03,8D,00,DE,A9,15,8D,00,DE
50120 DATA A9,00,85,FD,A9,88,85,FE,60,A2,06,20,D3,80,CA,D0
50130 DATA FA,60,86,FB,84,FC,AA,A0,00,B1,FB,20,DE,80,C8,CA
50140 DATA D0,F7,60,AD,02,DE,29,01,F0,F9,AD,03,DE,60,48,AD
50150 DATA 02,DE,29,02,F0,F9,68,8D,01,DE,60,48,4A,4A,4A,4A
50160 DATA 20,F6,80,68,29,0F,09,30,C9,3A,90,02,69,06,4C,D2
50170 DATA FF
```

Listing 1

pen or mouse might be nice.

✓ Do you have a non-CZ synth? As mentioned earlier, CZPL provides a good framework for other patch librarians.

✓ Outside the realm of patch data transfers, where could Sysex come in handy?

USING CZPL

Fig. 3 shows a C-64 and CZ-101 ready for a patch exchange. The figure shows only a single synth in the MIDI chain, but there's no need to change your setup if several instruments are daisy-chained or connected via a thru box.

Your CZ should be powered on and be able to send and receive over MIDI channel one. (This condition is met when you first turn on your CZ.) Operating CZPL is simple—just follow the screen menus, and you'll be moving patch data around in no time.

CZPL has solved a lot of patch storage problems for me, and most importantly has finally gotten me off of my expensive RAM cartridge habit. I hope you'll type in the program and give it a try. **EM**

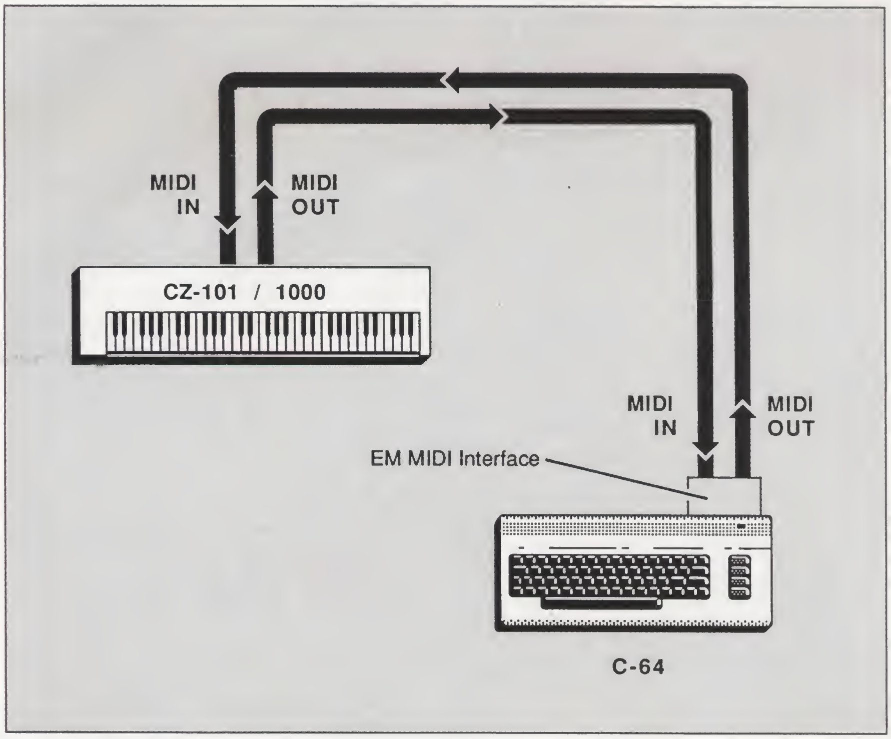
MIDI IN
MIDI OUT
CZ-101 / 1000
MIDI IN
MIDI OUT
EM MIDI Interface
C-64

Fig. 3 *CZPL MIDI connection*

THE SPM8:2 MIDI CONTROLLED MIXER. COULD THE BIGGEST SURPRISE BE ITS MAKER?

PATCH CHANNEL PARAMETERS
LEVEL
PAN
FX1 SEND
FX2 SEND
BASS
MID
MID FREQ
TREB
LFO SPD
LFO AMT
LFO MODE
X-FADE
ALL LEDS OFF = CHANNEL VOLUMES
HEADPHONE
FLAT
CHAN
CHAN
HOLD
STORE
PATCH FX PARAMETERS
FX1 RET
FX1 PAN
FX2 RET
FX2 PAN
MASTER VOLUMES
HEADPHONE
LEFT
RIGHT
SPM 8:2
SIMMONS

If you play a multiple set up of keyboards or electronic drums, you'll know all about the problems of audio mixing. You want to vary eq settings, effects sends, instrument positioning in the stereo image and levels during the performance.

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The SPM8:2 from Simmons is a full function, 8 channel stereo mixer. It is extremely simple to use, can store up to 64 mixes and even includes a programmable effects section.

FEATURES:
8 programmable channels
64 memory patches — switched via MIDI
Individual input gain controls for each channel
3 band eq with sweepable mid band on each channel
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Pan control on each channel
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SIMMONS

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What good is playing loud if you can't play soft?

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Highest Quality Sounds

The R-100's sounds are stored in a 12-bit companded format, which yields a higher sound quality than methods used in other drum machines. To get technical for a moment, bits are akin to decimal places on a calculator. The more digits, the more accurate the result. This directly results in lower distortion. Companding further reduces the distortion level, below that achieved by equivalent linear formats.

The 32 kHz sampling rate insures a wide frequency bandwidth, which makes it perfect for any musical application, even making compact discs.

24 Different Instruments

Inside the R-100 are twenty-four individual sound recordings, including three different snare and bass sounds, separate high, mid, and low toms, as well as six cymbals. There are open and closed hi-hat sounds and a footswitch to change between them. A full complement of percussion sounds are also included, such as conga, timbale, tambourine, shaker, agogo, clave, and handclaps.

Besides velocity, each note is programmed with it's own pitch and stereo pan setting. This enables you to create a monster drum set using the three toms tuned to 20 different pitches that pan across from left to right, for example.

Professional Features

The R-100 also has features that professional musicians require, such as eight individual outputs, synchronization to MIDI, tape, and a variety of clock sources, as well as a full MIDI implementation including Song Pointer (a must for film scoring).

The R-100 has memory for 100 Patterns and 100 Songs. If you play live, you'll appreciate the Chain mode, which lets you group songs together. You can even overdub drums within a song. And it's easy to save and load your data on memory cartridges, tape, or via MIDI.

Made by Japan's second largest manufacturer of musical instruments

The R-100 is designed and built to the same high quality standards that have come to be expected from Kawai...master builder of quality musical instruments for the past sixty years.

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24200 S. Vermont Ave.
Harbor City, CA 90710-0438

KAWAI
The Master Builder

Just getting into sequencing? Don't reinvent the wheel—here are some tips from a musician who has "been there before."

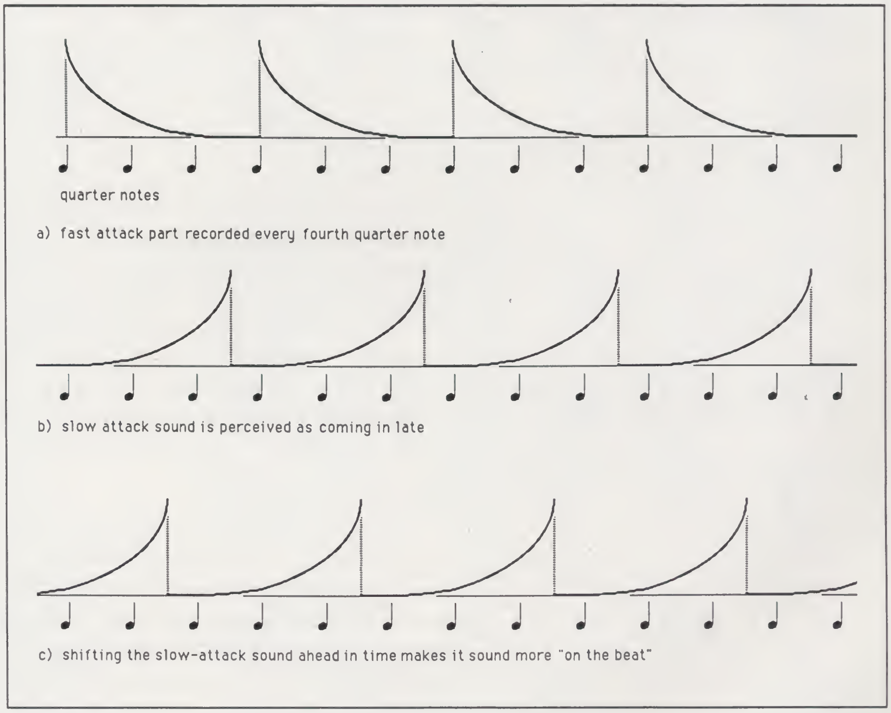
Software Sequencing Tips

BY JEFF KERSCHER

Thanks to MIDI, a musician no longer has to be a rocket scientist to play the computer game. Some very useful software has come out in the last few years and helped turn the personal computer into the Swiss Army Knife of music; in particular, sequencers have become some of the most popular music software around.

> **"For the world's cleanest digital delay, use your sequencer to put MIDI 'echoes' into your productions"**

Whether it emulates a multi-track tape machine or takes a pattern/module approach, a good sequencer used to its fullest can offer a musician fast and accurate editing capabilities and nurture a flexible, productive creative environment. If you already own a software sequencer, the following editing tips can help you get more out of your music-making system. If you haven't taken the sequencer plunge yet, the techniques below might give you the push you need.



a) fast attack part recorded every fourth quarter note

b) slow attack sound is perceived as coming in late

c) shifting the slow-attack sound ahead in time makes it sound more "on the beat"

Fig. 1

PLANNING AHEAD

One way to avoid editing frustration is to give yourself some room to move right at the top. When you start to record a sequence, lay down one or two measures of count-in before the music actually starts. This space in front will not only help you play overdubs in time, but it may give you leeway down the line when unanticipated track manipulation becomes necessary. This empty space is also a good place to put program information that sets your synth patches (many sequencers record and play program change commands).

I often overdub "non-keyboard" events—program changes, pitch bends, breath controller data and the like—onto one track and note data on another; if you assign them both to the same MIDI channel, the synth will receive both types of data. This procedure helps out in a lot of situations. If, for example, I don't like my pitch bending performance on the first take, or if I change the timbre of a track and the original pitch bend data no longer does the trick, laying in a new controller track is much easier if it's independent of the note data—and re-doing it won't affect the note data I may have slaved over for hours. Separate note and controller tracks also let

---

Jeff Kerscher is singer, songwriter, and keyboardist for The Affair. *A regionally successful power-pop quartet,* The Affair *tours throughout the Midwest and the South. He also owns Crystal Ball Music Software, which provides software, system consultation, and custom synthesizer programming for Toledo, Ohio.*

Note Value	# of MIDI clocks
𝅝 whole	96
𝅗𝅥 half	48
𝅘𝅥 quarter	24
𝅘𝅥𝅮 eighth	12
𝅘𝅥𝅯 sixteenth	6
𝅘𝅥𝅰 thirty-second	3
3 𝅘𝅥 quarter note triplet	16
3 𝅘𝅥𝅮 eighth note triplet	8
3 𝅘𝅥𝅯 sixteenth note triplet	4
3 𝅘𝅥𝅰 thirty-second note triplet	2
3 𝅘𝅥𝅱 sixty-fourth note triplet	1

Fig. 2 *MIDI note values*

me give undivided attention to both the playing and the pitch bending (and of course, other modulation), and both my hands are free to play with all the wheels and levers I like.

Another part of planning ahead involves keeping written records of what patches you used on what tracks, the tempo, and so on. Even though sequencers often let you name tracks and sequences, take careful notes—or you could waste a lot of time if you come back to a sequence after several months and need to re-construct your work.

$$1 \text{ clock value (ms.)} = 1000/((\text{BPM} \times \text{ppqn})/60)$$

Fig. 3

JUGGLING CLOCK VALUES

If a sequencer lets you edit clock values for single MIDI events, you can do a lot more than just "auto-correct" your music.

First record your tracks with a patch that has a fast attack, like a piano. This will make it easier to lay in your rhythms accurately. Then if you want to use a patch with a slower attack time you can compensate, one MIDI clock at a time, for the apparent "late" attack of this patch. Just advance the track in time, that is, edit the note-on data to occur earlier by whatever amount is necessary (**Fig. 1**). Some sequencers include a track-shift feature that allows for shifting an entire track backwards or forwards in time.

Use the same technique to add the right feel to a performance. Advance a track, or even just part of it, to make it play slightly ahead of the beat for a hotter feel; delay the track for a more laid-back effect.

For the world's cleanest digital delay, use your sequencer to put MIDI "echoes" into your productions. Copy track one onto track two, for instance, and slip the new track back a few clock values. Delay it by some subdivision of the tempo—an eighth note, for example—and then edit the velocity of track two to lower the overall level of the echoes. Velocity editing can be done on a note-by-note basis; some sequencers allow for "global" velocity changes on a track where the entire track can be raised or lowered in level.

For even niftier effects, play the echo on various MIDI devices with different sounds; transpose the echo track; or—if you have no respect for your reputation—echo the digital piano on track one with a sample of barking dogs on track two; or slip track two *ahead* in time to make a sweeping, thunderous noise patch segue into a sampled orchestra hit on track one.

Sequencers usually run at clock rates of 24 pulses-per-quarter note (ppqn). Take a look at **Fig. 2** to relate the number of MIDI clocks to various note values. This is a useful reference for any MIDI clock editing tricks you'll want to try. And while we're on the subject, use the equation in **Fig. 3** to determine the time in milliseconds of one clock value. Of course, the higher the clock rate you use, the higher the delay time resolution.

For example, at 120 Beats Per Minute and a 24 ppqn rate, 1 MIDI clock = 1000/((120 × 24)/60) or 20.83 ms.

SEQUENCING DRUM PATTERNS

If your sequencer is at least as sophisticated as your drum machine and has enough track memory, try recording drum tracks into the sequencer from a keyboard or dumping them in from the drum machine. During playback, have the sequencer fire the drumbox like an ordinary MIDI synthesizer. Record a basic groove on one track, then do fills, hits and other decorations on another. This simplifies editing as well as signal processing of individual drum sounds.

> **"I often overdub 'non-keyboard' events—program changes, pitch bends, breath controller data and the like—onto one track and note data on another"**

If you own a drum machine that accepts velocity data but doesn't have velocity-sensitive pads, record snare rolls with a velocity-sensitive keyboard to make the roll sound less like an automatic weapon and more like a real drummer.

Not all sequencing software has all these capabilities, but whatever capabilities your sequencer does possess, a little imagination can turn your computer into a useful tool for creating and recording music. And in the real world, where time is often money, it can help you save a little of both.

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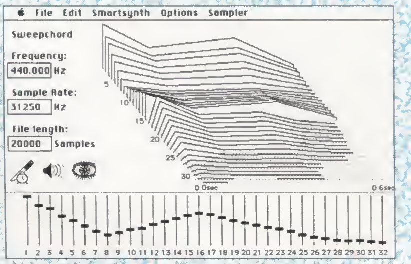
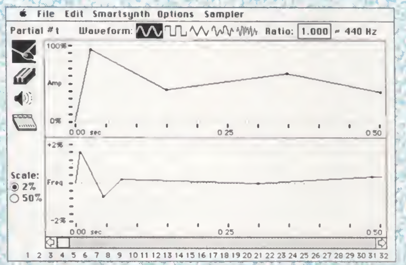

File Edit Smartsynth Options Sampler
5
10
15
20
25
30
0 0sec
0 6sec
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

Sweepchord

Frequency: 440.000 Hz

Sample Rate: 31250 Hz

File length: 20000 Samples


File Edit Smartsynth Options Sampler
Waveform:
100%
Amp
0%
0 00 sec
0 25
0 50
+2%
Freq
-2%
0 00 sec
0 25
0 50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

Partial #1

Ratio: 1.000 = 440 Hz

Scale:
● 2%
○ 50%

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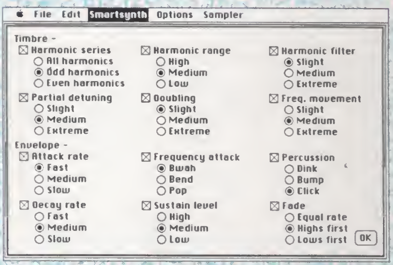
File Edit Smartsynth Options Sampler
OK

Timbre -
☒ Harmonic series
  ○ All harmonics
  ● Odd harmonics
  ○ Even harmonics
☒ Harmonic range
  ○ High
  ● Medium
  ○ Low
☒ Harmonic filter
  ● Slight
  ○ Medium
  ○ Extreme
☒ Partial detuning
  ○ Slight
  ● Medium
  ○ Extreme
☒ Doubling
  ● Slight
  ○ Medium
  ○ Extreme
☒ Freq. movement
  ○ Slight
  ● Medium
  ○ Extreme

Envelope -
☒ Attack rate
  ● Fast
  ○ Medium
  ○ Slow
☒ Frequency attack
  ● Bwah
  ○ Bend
  ○ Pop
☒ Percussion
  ○ Dink
  ○ Bump
  ● Click
☒ Decay rate
  ○ Fast
  ● Medium
  ○ Slow
☒ Sustain level
  ○ High
  ● Medium
  ○ Low
☒ Fade
  ○ Equal rate
  ● Highs first
  ○ Lows first

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It's time to meet the audio component with a magnetic personality—recording tape.

Tape Basics

BY KIM DORELL

Let's start our brief tour through the winding world of audio recording tape with a simple question: How much do we need to know about tape?

Simple answer: Enough to buy the right kind for the project.

Which leads to another even shorter question: How many kinds can there *be*?

Not-so-simple answer: *Lots.* So let's take a look at the kind of tape—analog-style magnetic recording tape—that most artists use, and will use for some time to come.

Tape is the easily tangled strip of plastics, rubbers, and coatings within which tiny metal filings have been sown in deliberately random patterns. Sounds sent into a tape recorder will cause the record heads to emit magnetic fields of specific shapes, which will reorient the filings into analogous patterns representing the sounds. These patterns can be listened to, kept, or erased (that is, made random again).

Tape is thus a very thin and long *electronic scroll* onto which sounds are written in order to be read back (listened to).

There are a bunch of technical terms and considerations involved here, but I'd like to leave that to the techies for the time being and discuss some basic, user-oriented concepts and practices for the use and care of magnetic tape.

GETTING STARTED

It's time to lay down tracks, and you're reaching for that roll of tape half-used on an abandoned project in 1981. It's the right length and width. No problem, right? Right, with some major exceptions.

This scroll of tape has all the characteristics that wrapped-up materials usually do. It doesn't want to be unwound again and, if it is, it will lose pieces of its surface and shed dust all over your record heads in the process. It will have gotten curled, wrinkled or edge-curled in storage. It may have gotten moist and leaked symbols (magnetic patterns) from one layer to another, or its markings may have gotten blurry and faint over time. Scrolled tape does all these things.

Absolutely, it is best to use new tape. If you *do* use tape that's already been recorded, take a good look at it to be sure no edges are sticking out or flattened against the reel. If there are, you're quite liable to lose at least one track to the nether world of single socks and old coat hangers.

With old tape it's also important to keep a sharp eye out for flaking or loss of coating. These conditions will cause serious degradation of your sound and will necessitate at least a good cleaning of your tape transport mechanism. No tape that is losing its oxide coating should be used for any mastering purposes.

Second, always use the highest-quality tape a given manufacturer offers. Only the highest grades offer the retentivity, coercivity and all those other characteristics that, despite their linguistically hostile names, mean a very friendly thing: that your recording will last awhile. The importance of using highest-quality tape applies to every generation of a project. Logic alone will tell you that it's no use spending hours constructing a great multi-track tape only to end up with a blurry half-track master because you wouldn't spend another five dollars on good tape. Similarly, why go through all this and

---

Kim Dorell is a songwriter, arranger, and recording artist whose work has earned him favorable coverage in Variety, Op, After Dark, *and the* L. A. Times.

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Now let's consider compatibility. Just as some inks will do nothing but smear and make a mess on the wrong paper, some formulations of tape don't accept the signals of some machines very well. The difficult solution is to re-calibrate the machine to deal with a particular type of tape. A simpler answer to the compatibility problem is to ask the studio what brand to use, or better yet, buy the tape from the studio. None I've worked in charges more than standard, single-quantity list price for multi-track and mastering tape, so at least it's not a rip-off, and if difficulties *do* come up with the tape's coating or stability (it happens only once every 17,000 years, but it does happen) a quick trip to the tape closet will let the session continue uninterrupted.

Remember, compatibility applies to every generation. All machines, from mastering devices to cassette players, have tape preferences and we want to honor them since the machines, in this case, are solidly in control.

HOW MUCH AND HOW LONG?

Your next consideration is the amount of material you want to record and the amount of tape you will need to use. These are not trivial concerns. Given that a single reel of 2-inch tape can run $200, mastering tape $40 and high-quality 45-minute cassettes may cost $3 apiece at discount, a band doing long dance tracks or lingering classical pieces may well find a third of their recording resources used up simply buying tape. It is vital to plan ahead, considering the operative elements: tape length, tape thickness and tape speed.

In calculating the right length reel to use, if a "slight" miscalculation occurs, it can mean your tape flaps off the reel in the middle of what might have been the hottest ending ever recorded. We can theoretically splice a little more to the end of the reel, but this will likely produce splicing noise. Reels are already packed pretty full and at the high speeds of multi-track tape, what you could splice on wouldn't be much.

But tape does not live by length alone. Thickness also determines how much material you can record. Thinner tape doesn't stack up as fully, so more tape (often 3600 feet instead of 2500) can fit on the same reel, giving you more recording time. Since a lot of the cost of a reel of tape lies in the reel itself (repeatedly tested for straightness so *it* won't curl or otherwise damage the tape wound on it) you end up getting much more length for very little extra cost. But this solution has its problems. One is mechanical. When thinner tape (1.0 mil, or one one-thousandth of an inch) whirls repeatedly through a machine, it might stretch a bit and lower the pitch of all the sounds in the stretched section. It does happen. The second problem is print-through. Thicker tape (1.5 mil) presents a barrier between the layers of wound tape. Thinner tape has much less of a barrier, and the result is print-through: a softer version of the sound from one spot on the tape being copied onto the spot it's lying against while wound up—free echoes where you *don't* want them.

> **"All machines, from mastering devices to cassette players, have tape preferences and we want to honor them since the machines, in this case, are solidly in control"**

The third element is speed. Tape runs at several speeds. The faster the speed, the clearer the sound will be, since many more metal filings get involved in forming the magnetic shapes representing the individual sounds and giving a much more accurate representation of what was originally performed. At lower speeds, on the other hand, tape lasts longer and you can fit more material on a reel for the same cost. Multi-track tape typically runs at 15, or 30 inches per second (ips). A tape running at 15 ips will be able to record for twice as long as one running

—continued on p. 112

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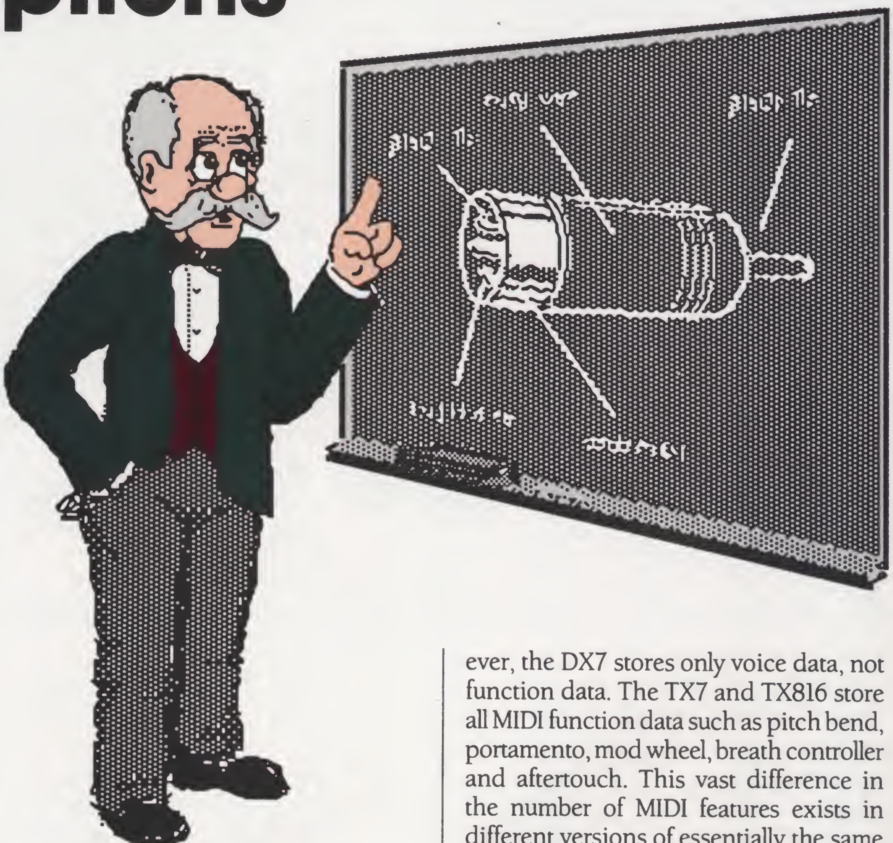
The 15 Most Common MIDI Misconceptions

BY LESLIE FRADKIN and
ELIZABETH ROSE



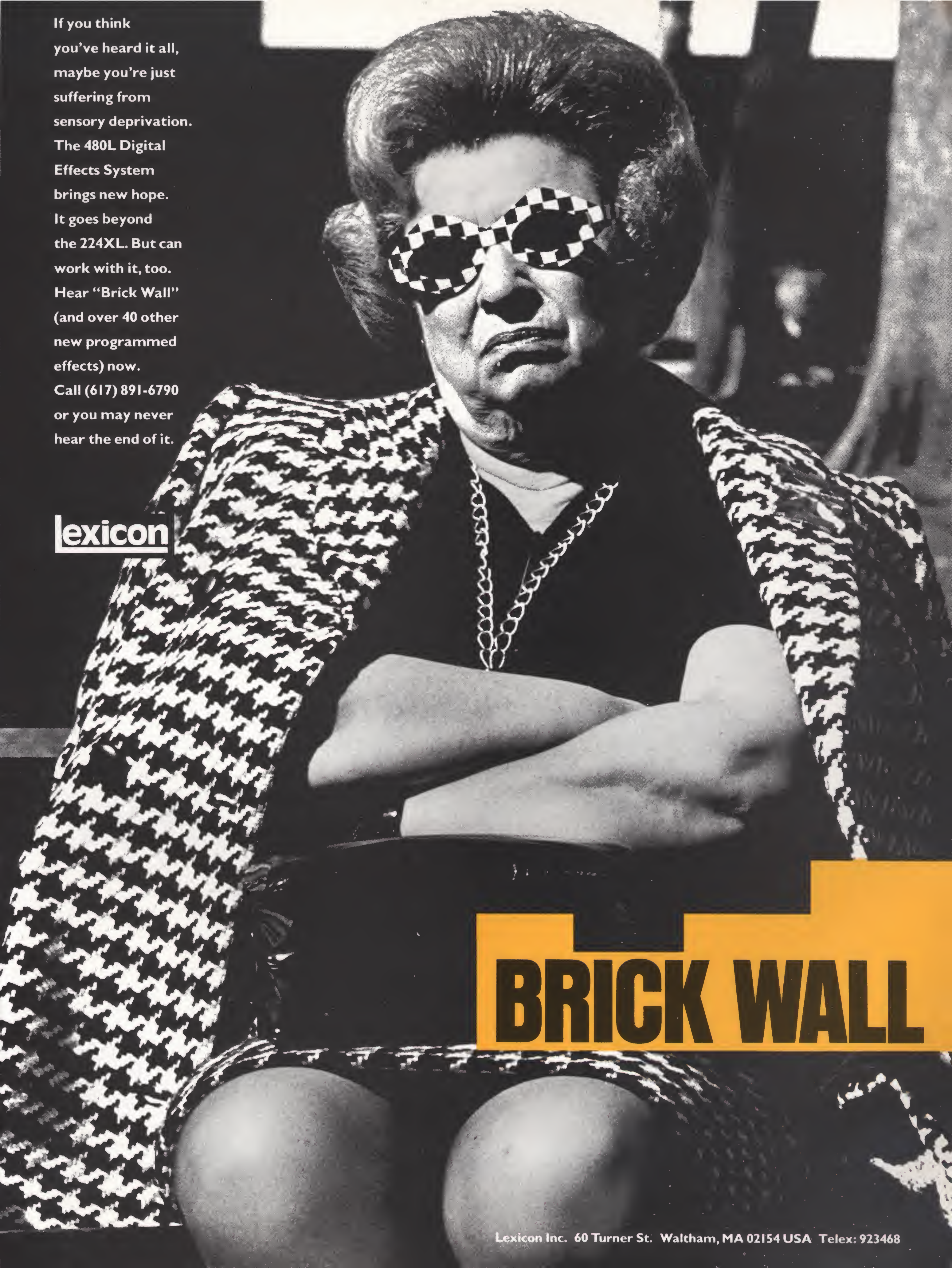
With innumerable megabytes of new information about MIDI rapid-firing down the brain wires, it's at times an overwhelming task to sort out the useful from the trivial information and keep everything straight. Certain basic facts stick in the memory cells: that MIDI data transmits on up to 16 channels; that you'd better have a couple of five-pin MIDI jacks on your synths for them to talk to each other; and that it's gonna take a lot of time to get the rest of this stuff together!

That's pretty much where we all started from when the first MIDI jack grinned its cute little five-toothed plug at us. Since then we've found that many of the people with whom we work are harboring some basic misconceptions about MIDI, so let's clear up 15 of them and make MIDI a little less muddy.

1. *All MIDI implementations are created equal.*
Actually, there is a great deal of variation in the number of MIDI features found in any two pieces of MIDI gear. You *do* get what you pay for; it costs a company more money to include more MIDI features. To accommodate all types of customers, manufacturers offer several levels of sophistication in MIDI equipment. As one example, consider dedicated hardware sequencers. The Yamaha QX21, a basic sequencer priced below $300, can sequence about 8,000 notes, includes song position pointer (for autolocation applications), and offers merging, quantizing, and basic insert/delete functions. That price does not allow for note-by-note editing or the ability to unmerge two channels, and the unit does not include a disk drive. At the other end of the price range, Roland's MC500 sequencer ($1,295) has a 20,000 note on-board memory, and an internal disk drive that can permanently store 100,000 notes. The MC500 can unmerge data, record system-exclusive data, and provide note-by-note editing on its small LCD. It also outputs and recognizes song position pointer. You're mostly paying for expanded note storage, extra MIDI editing features and more memory (memory is expensive).

Another interesting discrepancy is the number of MIDI features found in Yamaha's DX7, TX7 and TX816. The latter two are modular versions of the DX7. The major difference is that the DX7 has a keyboard and the others do not. However, the DX7 stores only voice data, not function data. The TX7 and TX816 store all MIDI function data such as pitch bend, portamento, mod wheel, breath controller and aftertouch. This vast difference in the number of MIDI features exists in different versions of essentially the same instrument!

2. *You need an external computer to do things with MIDI.*
Although a computer is a handy device for your studio and makes you look very cool on recording dates, it is quite possible to operate a decent MIDI system without one. Either of the dedicated hardware sequencers mentioned above will let you record, edit and play back up to 16 MIDI channels; in fact, you can make excellent demos with a basic hardware sequencer, a couple of synths, and a drum machine. Remember, though, that a computer is great for visual editing programs that run with samplers, and there's not a dedicated hardware sequencer on the



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market that doubles as a word processor or helps you keep track of your finances.

3. *You can store one synth's patches in a different make of synth.*

There are a number of folks who are pulling their hairs out trying to store DX7 patches in Casio CZ101s. Unfortunately, each synth has a different internal configuration that produces and structures its sounds. DX7s use sine wave operators for FM synthesis, Oberheim's Matrix-6 uses voltage controlled oscillators and filters (subtractive synthesis), Casio synths use phase distortion, and so on. There is no common language for sound storage between these different synths, and therefore, no way to transfer patch sounds from one instrument to another. The only exception is that some programs allow you to re-format samples from one sampler into a format suitable for storage in a competing sampler.

4. *MIDI data recorded on one sequencer is only playable from that sequencer.*

Here's the good news: just because you can't store patches from one make of synth in another doesn't mean you can't transmit sequenced data from one *sequencer* to another. Sequenced data is, fortunately, a common language. It generally consists of note-on/off MIDI data, velocity, modulation, and so on, as described in the MIDI specification. Therefore, a note-on command looks the same to a Korg SQD-1 sequencer as it does to Musicsoft's "Texture" sequencer. You can therefore transfer your sequences by synchronizing both sequencers to a common clock, playing back the sequencer data from one sequencer through the MIDI Out, and recording this data into the other sequencer (set to record) via the MIDI In. However, you must have both sequencers present to do this. You can't just dump your sequences to cassettes or floppy disks, carry them across town to your pal's studio, and try loading the data into a different type of sequencer. Even though MIDI data is standardized, disk storage protocols are not. Sequencers don't even necessarily use the same-sized disks.

5. *The number of tracks you can record on a sequencer is the number of tracks you will hear on playback.*

Sorry, if you want to hear 16 different tracks, you need at least 16 individual sound-generating modules. These can be 16 different synths, or a lesser number of *multi-timbral* synths. The latter allow you to assign different voices to individual channels. Thus, a four-voice multi-timbral synth can play back single-note data from four channels simultaneously; four such synths could play back 16 single-note melodies. Of course, to play back chords you would use up more voices. Generally, you will use some mix of standard polyphonic synthesizers and multi-timbral synths to fully use a sequencer's capabilities.

If you want to hear more parts than your instruments can support in real time, you must record a sync tone on tape, tape your first layer of synths, sync and record the next layer of synths, and so on. Or for about $70,000 you can buy a Fairlight Series III, which outputs 16 MIDI channels (128 timbres) simultaneously from each of its four MIDI Out ports. Nothing to it.

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6. *If one synth sends velocity, a non-velocity synth can respond to this data.*

In the words of Mr. Spock, this is illogical. Yet many people think that when they're playing a synth that responds to and produces velocity infomation, and triggering another synth that does *not* respond to velocity, the velocity synth will magically override the non-velocity synth's limitations. There is no such magic. Non-velocity synths trigger all notes at MIDI velocity code 64, the MIDI number for medium velocity. The same is true of aftertouch; if you send aftertouch information into a synth that cannot respond to aftertouch, it will simply not recognize the data.

7. *Some people try to connect MIDI in jacks to MIDI in jacks and MIDI outs to MIDI outs.*

This does not work unless you are setting up a MIDI patch bay for a number of synths and sequencers. Otherwise, a MIDI Out goes to a single MIDI In. MIDI Thru (which carries a replica of the MIDI In signal and is electrically like a MIDI Out) also feeds a single MIDI In.

8. *Assumption: all sequencers play with the same resolution.*

There are vast differences between sequencers when it comes to pulses-per-quarter note, or "resolution." Southworth's *Total Music* for the Macintosh and Music-Soft's *Texture* for the IBM both play with a resolution of 120 (i.e. a quarter note on these sequencers can be divided into 120 discrete parts). *Performer* for the Mac has a whopping 480 ppqn; Yamaha's QX-1 and QX-7 output 384 ppqn; and Voyetra's "Sequencer Plus" and Yamaha's QX-21 both have 96 ppqn resolution. Depending on your needs, the amount of resolution on a sequencer might very well make a difference. In film or TV scoring, the ability to move clocks around is very important. What seems to be a tiny shifting of a note can really make a difference when trying to get a sound effect to occur *exactly* at the same time as action on the screen. However, note that if you quantize (or autocorrect) your data, the amount of resolution doesn't make much difference since the quantize value you choose (eighths, 16ths, etc.) overrides the sequencer's resolution anyway. Resolution only becomes important with real time playing.

9. *You can play a note on one synth and always hear a response from a connected synth with no regard for channel selection.*

This is only true if both synths are operating in Omni mode. Otherwise, you must set your synths to send and receive on the same MIDI channel. If you set a master synth to send on MIDI Channel 1, any slave synths must receive on MIDI Channel 1. One way around this rule is to use a channel filter (such as Roland's MPU103 or Yamaha's MEP4 data processors). They can receive on Channel 1 from the DX7, for example, and convert the channel data so that it is then transmitted on a different MIDI Channel. The MPU103 can also filter out unwanted data; for example, if you merged Channels 1 and 2 and want to get rid of Channel 2, the processor will filter it out. The MEP4 is a marvelous device that can do almost anything with MIDI data—separate controller and function data from voice data, process channel data, etc.

10. *All manufacturers' program/patch number systems are the same.*

The annoying truth is that while all manufacturers use the same MIDI numbers for controller and function data, there is some variation in the numbering systems used for patches. The MIDI standard is 0-127; however, some manufacturers don't even number patches sequentially, but as banks of a certain number of patches. You may need to do some conversions when imbedding patch change commands in sequencer tracks.

11. *Once you've recorded a track on a sequencer, you're stuck with the sound and the performance.*

Not at all true. As noted before, sequencing records note-on/off, function, and controller data—not sound. If you play a real time performance from a keyboard using a string patch, and decide you want a horn section on playback, all you have to do is change the sequencer's patch number (or imbed the patch change command in the sequence). Remember, this isn't tape. You've already recorded the note-on, note-off data (which is analogous to note information in traditional music notation), so when you change the patch from strings to horns, the "horns" will play back the same note-ons and note-offs you told the strings to play. This is like a saxophonist playing from a cellist's sheet music.

—continued on page 113

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Ultravox, Kraftwerk, the Eurythmics and Cluster are but a few of the artists who have benefitted from Conny Plank's creative production/engineering. Here he shares with EM readers the elements of his genius.

Crazy at Conny's

BY JOHN DILIBERTO

Artists from Kraftwerk to the Eurythmics to Killing Joke have come to Conny Plank to produce and engineer their records. If you think it's because he's a production wizard whose ability to make electronic sounds come to life on vinyl has made Conny a legend in German electronic music circles and a savant to a younger generation of Anglo-rock musicians, you might be right.

But it could be his burly, Papa Bear cuddliness. Standing at a lumbering 6'4", looking like a center for the New York Giants, Conny rules over his studio with Buddha-like serenity, his enthusiasm and joy contained behind a bemused grin.

In Conny's Cologne studio, German new wave composer Arno Steffens is bounding off the walls, extolling the technological tricks of a new angst-ridden track we're hearing on playback. "You hear that bass drum?" he exudes. "That's the hood of a Cadillac being slammed," he gesticulates wildly. "Only old American cars have that power." Conny meanwhile, sits quietly, an ever-present cigarette sandwiched in his stubby fingers, a twinkle glimmering behind his sleepy, pale blue eyes as he casually explains how none of the music on Arnos's record, Schlage, *comes from real instruments, but instead are natural sounds sampled into his Emulator II. The track is massive. Huge percussive chunks roar out of the giant JBL monitors in a battering ram of rhythm.*

You probably haven't heard Arno Steffens, whose records aren't released in the U.S., but no doubt you've been floored by some of Plank's other work with Ultravox, Kraftwerk, Killing Joke, the Eurythmics, Deutsche Americanisher Freundschaft (DAF), Holger Czukay and Cluster. Whether using synthesizers and computers or recording German folk groups, Conny has a unique understanding of how to create that elusive "theatre of the mind."

Like most of the electronic German generation, Conny was born of '60s psychedelia, given vent in the electronic music studios of West German Radio in Cologne. As an engineer, he worked with icons of 20th century music like Karlheinz Stockhausen and Mauricio Kagel. In the late, after-sessions hours, Conny experimented with classical musicians. Sitting at the mixing console, he generated free-form compositions, sending out echoes and filtering changes in real time. The results can be heard on a Deutsche Grammophon boxed set called Free Improvisation, *with a group aptly called Wired. "It was like dub-mixing," explains Conny, "but live dub-mixing so it was an improvisation together."*

A rudimentary musician himself, Conny's creativity comes at the mixing console. Whether listed as producer, engineer or musician, his impact is crucial. He shaped the sounds of the first four Kraftwerk albums, including the international hit, Autobahn.

PHOTO: JOHN DILIBERTO

Producer/synthesist Conny Plank

***John Diliberto** is the producer of* Totally Wired: Artists in Electronic Sound, *a weekly program on electronic music produced for Pennsylvania Public Radio Associates and broadcast on public radio stations across the United States.*

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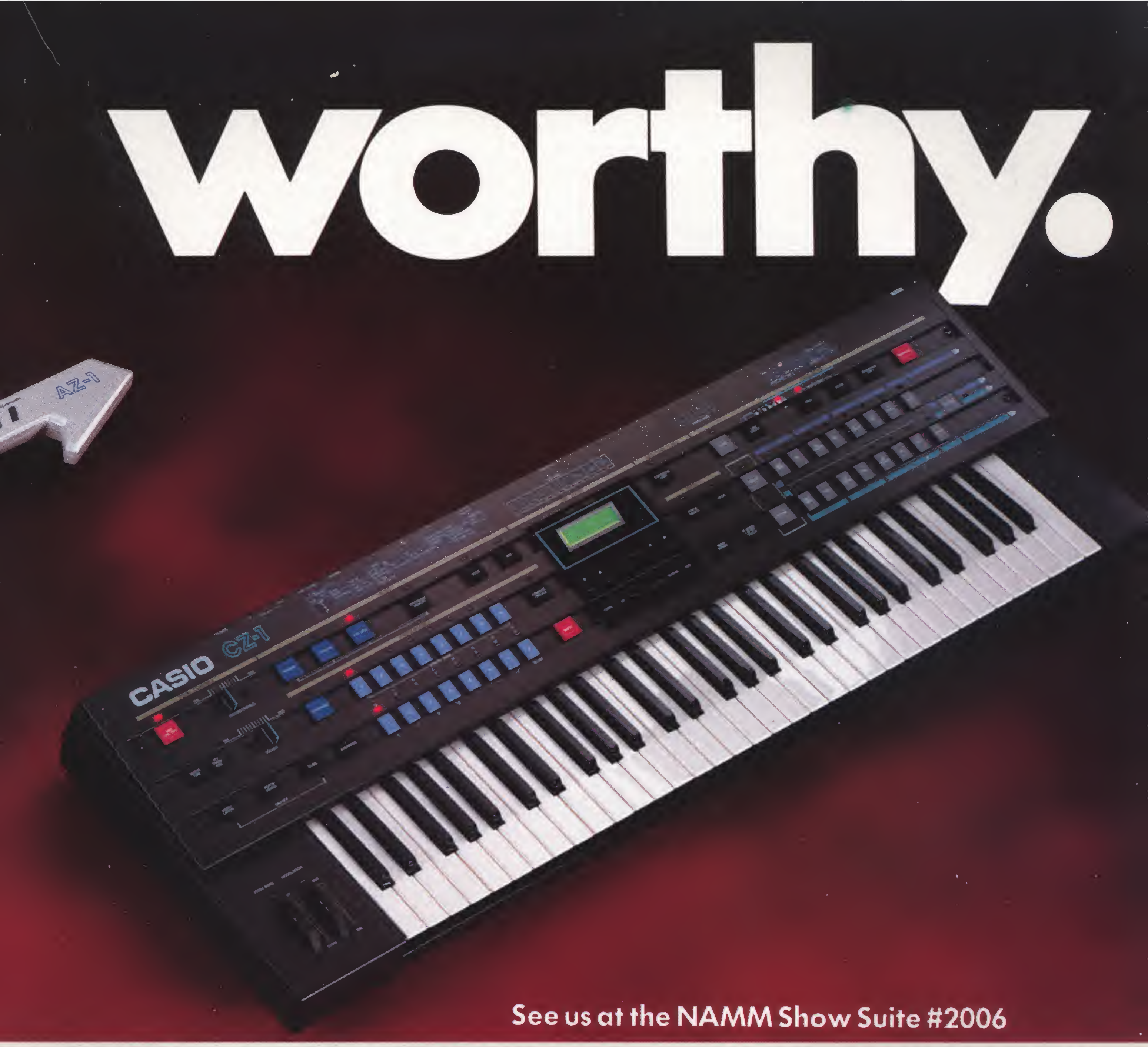

troller is an easy way of adding mobility to your abilities. It's battery powered, touch-sensitive and will support all 128 program changes, even over two MIDI channels. The AZ-1 can be used to control any function of any MIDI instrument on the market by the use of ten controllers, five of which are user-definable. This allows you to customize its performance to match your set-up, no matter how your gear changes.

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Nearly anyone touching a synthesizer in the Cologne-Dusseldorf region came to Conny. His relationship with the Cluster-Harmonia-Neu axis even led to him recording as an artist with Dieter Moebius from Cluster (*Rastakraut Pasta*, *Material*, *Zero Set*, all on Sky).

His work with these seminal electronic ensembles was heard by the post-new wave generation of British musicians who'd opted out of the rudiments of punk and exhausted the limits of Euro-disco. Ultravox recorded their brilliant swan song with John Foxx, *Systems of Romance* (Antilles), and returned to Conny's Studio for their comeback, *Vienna* (Chrysalis). The success of *Vienna* and its successor, *Rage In Eden* (Chrysalis), were due in no small part to the edgy, nearly psychedelic environment that Conny generated in the studio.

After two recordings, *Quartet* (Chrysalis) and *Lament* (Chrysalis) produced by George Martin and themselves respectively, Ultravox has returned to Conny's Studio for their forthcoming album.

In September and October Conny made his first live performance on a Goethe Institute tour of South America. He played a DX7, a trumpet, the mixing desk and an 8-track tape of pre-recorded backings; Dieter Moebius played an Arp Odyssey and an Oberheim synthesizer; Arno Steffens sang and played the Emulator II. "It was rhythmic and psychedelic electronic music," exuded Conny over the phone recently. "It was partly free-form, partly composed. I had an 8-track with me, mixed with sequences and sounds as a background and I used it in a dub-mix way so I had the possibility to change it in reaction to the other musicians." Fortunately, six weeks worth of concerts were recorded for a future album.

ULTRAVOX
VIENNA

Conny lives in the outskirts of Cologne where he owns a beautifully re-modeled farmhouse. In the adjacent barn resides his studio, its cozy control room over-powered by monster JBLs, two 24-track Otari's and two MCI computer-controlled mixing consoles. Since I was last there, however, Conny has replaced the MCIs with an automated custom console designed by Michael Tahl and Peter Lang. "I didn't want to buy an SSL (Solid State Logic), he says. "I wanted a toy that was faster than these other desks. When I work on SSL desks I feel like an accountant."

Spontaneity and interaction are the elements Conny seeks, even with computers. "I just got a new program to work with the Emulator II on my Macintosh, by Digidesign, called *Sound Designer* to edit sounds, loops. I use the Linn sequencer same as in the 9000 but a separate unit which is nice because I can use it in flying mode. I don't like to think too much when I design a sequence. I can kick in or punch out notes like a dialogue with a machine."

A recent pilgrimage to Conny's Studio was made by the Eurythmics for whom Conny will be producing a live recording in Japan. Conny

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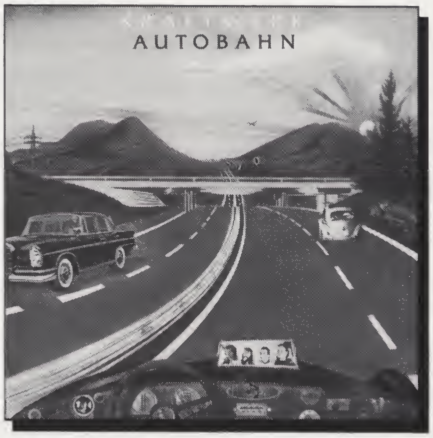
produced the very first Eurythmics record, In The Garden *(RCA import only), before their electro-pop smash,* Sweet Dreams *(RCA). On their latest record,* Revenge, *Conny contributed some drum sounds. "It wasn't a session," demurs Conny. "We were sitting around, exchanging ideas and being crazy."*

For Conny, being crazy is what it's all about. "Craziness is holy," exclaims Conny, in the mysterious, dramatic voice he uses when he wants to be emphatic. "When I talk about this hip-hop music and what they do in New York, it's not crazy enough. It's attractive and they have sensations, but it's not crazy. When I listen to Charlie Parker it was crazy. When I listen to Charlie Mingus it was crazy, but this is not crazy. Craziness is something holy."

EM: *What was it like in the early days with Cluster, Kraftwerk, Harmonia, the Sky label?*
CP: At that time we all were influenced by English and American music. We also listened to Koenig, Stockhausen, Varese. I used to work with these people in '67, '68, and '69. Mauricio Kagel gave me a lot of ideas about sounds. In those recordings I worked with very academic musicians being very precise doing these sounds, and to me it seemed lifeless, and dry. I then tried to find people that looked in a different way to these materials, that tried to improvise with these dirty sounds, these electronic sounds—to have a feeling like a jazz musician has to his instrument.

We often worked with cheap toys and used them in a strange way. We distorted a lot of things and filtered sounds very radically but we didn't call ourselves electronic musicians. We used any scratch on guitars, or noises on an instrument...we used pianos and scratched the strings and put echoes on them, and tried to find drastic or attractive elements that turned us on.

The first set-up of Cluster was interesting. We had five oscillators, a few tube distortion units where we sent the sound through the tube and could adjust the amount of distortion. We had echoes where you could change the speed of the echo in real time. We used normal organs and Hawaiian guitar; when you treat a Hawaiian guitar really heavy it sounds like electronic music. We used tape-loops. We had a quite complex setup of all these things that were mixed. Sometimes we worked with a drummer, sometimes with cheap Italian machines.



Ultravox told me that when they heard Neu and Harmonia records they got inspired by this because of the different point of view. I think Lou Reed and John Cale and the Velvet Underground were in a similar situation. They were very naive, exploring new things, using the old rock and roll but with different ears and different experience of heavy city life. You do something and you don't realize how good it is. When you talk to Lou Reed today he says he never realized how good this was. They just did it unconsciously, by accident, and later on found out how important it was to pop music.

We were also influenced by the Velvet Underground. When I got this "banana" record produced by Warhol, we were immediately influenced by that. We said this is a fresh approach. They didn't care about the beauty of sound, they just went for a basic feeling of a true situation.

EM: *In the last few years there's been a growth in producer/artists like Trevor Horn, Martin Rushent, Arthur Baker, who are virtually creating the music of the people they produce. You produce music yourself, but under your own name.*
CP: I admire some of these producers because they handle sounds very well. What I don't like is that most of their work sounds constructed. They go for an immediate sensation. Is it attractive? Is it acceptable? Does it sound impressive?

To me music isn't just interesting sounds. There must be content, an articulation, a state of mind, that I feel from the music because music to me is like a person. To me it presents an interesting state of mind. I think this has gone out of some music so that becomes more mechanical. Fantastic designs—it's mannerism. I don't say that about all of what they put out. Some of it is beautiful, but that's very rare and some of them are not very conscious about the content of music.

I just worked with a famous disco producer in New York, Francois Kervorkian (who produced Kraftwerk's newest album, *Electric Cafe,* on Warner Bros.) and he was a very good engineer and very good mixer, but I noticed that he just was looking for impressive sounds. He wanted to be sure nothing was ever boring so that everything was up, up, up. After a while I said to him, "You're always

From left to right: Arno Steffen, Dieter Moebius, and Konrad Plank

PHOTO: ©HERMAN SCHULTE

going up, up, up and you don't have any dynamic anymore. You also have to come down to build it up again. How can you live under this pressure to be up all the time? It's crazy." It's like putting music through a limiter to keep every note on the same level. So nothing was quiet, everything was extremely loud.

EM: *That's been the direction of popular music, however. To be constantly driving, with static, insistent beats. Especially with drum machines, where people go for the steady, hard driving sound. And you were doing that in the beginning, as well.*

ULTRAVOX : SYSTEMS OF ROMANCE

CP: Yeah, that's true. But I found something that was very interesting in making music with mechanics and programs. If you understand it right, you can make it come to life when you create a tension between the machine and you. As long as you can manage this, it will be interesting. But most of the music I hear today, you don't hear that. After a few listens it starts to sound boring because it has no secret anymore, because the sound that is programmed always sounds the same. Nobody works on the dynamics of the sound so it becomes monotonous.

It's easier to program than to get a musician in to play it right, so you produce more. So instead of producing less and having good musicians, they produce more and more, like a factory. It's like a music industrial revolution, like they produce cars. They produce music in the same way. When you look at old cars, they were hand-made and it was something really interesting as a piece of art. When you take a car today, you don't have these feelings about it. It's just a throw-away product.

EM: *You've been working with the Fairlight and Emulator since around 1982. In listening to this Arno Steffens record, was it almost all Emulator?*

CP: Basically it was played. We got a drummer in, a good friend of ours, and the basic track we always played so there is no mechanical feeling in the structure of the music. Then we looked for sounds that could replace the normal snare, tom-tom, cymbal sounds. We started to experiment with car crashes, with explosions . . . everything that a rock drummer dreams about, because they want to sound like a monster war movie. So we took the real thing and made a super heavy drum track out of it.

Then we found out that if you used a natural sound like a falling piece of iron, it has its own rhythm. It falls and goes dang-a-lang, dang-a-lang-a-lang or something. You listen to this noise and you find that you get an inspiration for a rhythm. It's like a Polaroid and you use that to make a rhythm out of it. Then I find it very interesting to use samples from an Emulator or Fairlight because you can make them come alive.

(Edgar) Varese was one of the first composers who used normal noises not made by instruments. He used metal material, wood blocks, all kinds of material like tin buckets and he called it *musique concrete*. We go on developing these ideas, using just normal everyday sounds, in the streets, the workshop, and we make music out of it.

EM: *It's interesting that you mention Varese, because he and Pierre Schaeffer, Pierre Henry and Stockhausen were the first samplers.*

CP: Sampling has been a technique for a long time. I always used bits of tapes to sample and now I use digital systems that are more convenient and practical because it's quicker and more precise to use. But it's no different from what I did before. It's only more clever.

EM: *How much are you processing the sounds after you sample them?*

CP: I use treatments, filters, echoes, reverbs and I have to adjust the elements to the ideas that I'm working on. It's like a carpenter with a piece of wood and to fit it into his construction he has to work on it. It's the same way with sounds. I have to adjust them to the picture that I'm working on.

I worked with a German group, the Humpe sisters (*Humpe-Humpe*, Warner Bros.). That was interesting because the girls sounded very sweet so I could make the music dirtier underneath. So there was a nice contrast between the heavenly voices and backing track.

EM: *What about pure electronic sounds? You were one of the pioneers of that on records.*

CP: I like synthesizers when they sound like synthesizers, not when they sound like natural instruments. I like them to have their own colors. The strange areas of colors that you can do with synthesizers is what's interesting for me, not just copying an acoustic instrument.

EM: *A lot of the records that you're involved with don't seem like they can be performed live. Your recording experience seems completely divorced from the live performance experience. I'm thinking of the Cluster records, Dieter Moebius, Arno Steffens.*

CP: We're in the same position as the old composers who needed musicians to play, but we prepare a program to play. We can put the programs, the music, the elements together in the studio and use this material and perform. This is the same process as when I mix something on the desk and I have all the elements there, the actual mixing is a sort of performance. It's playing, expressing something. This mixing can also happen in front of an audience because it needs inspiration, it needs attention and what the audience can give you. I think there's a possibility to do this on stage like what Lee Perry did with his dub-mixing. It was an incredible performance of a reggae song.

EM: *You don't seem to have a Conny Plank sound, yet it seems like you're very involved in the creative process of the records you produce and engineer.*

CP: I think it's a level in the spirit of the people that come together. The way I find people has to do with the state of mind of these people and how we communicate. That's what influences the product. I can be influenced by the musician so that the record comes out completely different from the last product I was involved with.

I also try not to have a "Conny Plank"

Ralf
KRAFTWERK
Florian

sound. I want to be different and colorful, like a painter who uses acrylics, oils and crayola, so I try to make the work I do sound different.

In the last four years I've moved away from programming and tried to work with musicians again in real time. I developed a system where I can use samples and programs with live music. That means you don't lock musicians into a program but you make a program that follows the musicians. That can be done.

EM: *Have you done that?*

CP: Yes!

EM: *Where?*

CP: Part of Arno Steffens material and with a band called Kowalski. When we used the sequences, I bound the sequence steps to the bass drum or a pattern of the drum kit so the whole program follows the drummer.

MOEBIUS ROEDELIUS

EM: *Is this what we were talking about in the studio, where the drum will trigger a sequencer pattern?*

CP: Yes, but it's live action. Before, when I worked with Ultravox, you had a sequence and the drummer had to follow the sequence. DAF was also an interesting example of minimal pop music. We had one sequence, one drummer and one voice. The drummer was able to create a tension between the sequence and him. Then it was interesting when you moved the filter of the sequence reacting to the drummer and then the drummer reacts again. That's a good way of making a mechanical thing work with live music.

EM: *Repeated rhythms have always been a hallmark of electronic music. First with tape loops, then synthesizers used as drums and finally the whole evolution of drum machines. You've been involved with every step of that development.*

CP: First there were these cheap Italian drum machines that just did this pop-pop-chink-chink sound. I was interested because there was a cold atmosphere around these little machines. They were incredible, stupid and locked, and this was an interesting element that you could relate to. I treated those machines, distorted them and changed their quality; it was meant to be a crazy mechanical element in the music. So the music you put on top of a thing like this is influenced by this silly little drum machine.

After a while the Japanese companies became more clever in the artificial drum sounds and then there was the step to the digital drum sounds. That's when the trouble started, because it sounded the same as drummers, more or less, and many drummers lost jobs.

But soon I got tired of those sounds because you get a picture of a real drum sound. When you use an electronic drum machine where the sound is electronic it's okay because the situation is clear. But with this, it's a bastard situation because it's the machine pretending to be a drummer. After a while, to me, it sounds more dead than an electronic drum machine. When a drummer hits his kit, every beat sounds a bit different. That

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you can't do on a drum machine. When the drummer hits the center of the snare its a bit different than when he's off-center. He emphasizes certain beats, and the range of expression available on a drum kit is much bigger than a real sounding drum machine. Machines that sound close to a real drummer are as stupid as synthesizers that try to sound like a real instrument.

EM: *I thought it was interesting that you produced the first Eurythmics' LP with an actual band, yet when they went off and produced the next one on their own, they went almost completely electronic.*

CP: They had no other choice because it's cheaper to work that way. Their first successful record that they did on their own, they did on an 8-track machine and they spent the time to program very carefully. It's much more expensive to hire musicians to work in the studio. So they had the time and their own place and they had an interesting development based on what we did before. Dave Stewart is a man with very good ideas so he went to a good producer, himself.

EM: *One of your techniques is to record a sound and then release it into an acoustic space and re-record it.*

CP: The most important thing is the right ambiance, how all the elements are together in one ambient situation. I discovered that when I record something that doesn't fit into the picture, I try to get all the elements I recorded together into one room through the speaker system and pick it up again, including the ambiance, with microphones. They seem to work better and have a more transparent relationship to each other. It creates more space in the sound picture. It has to do with the time that the sound travels to the wall and comes back. The ear is more accustomed to this situation than close-up sounds. You never listen to an instrument, holding your ear close to the instrument.

I also noticed that when musicians play with headphones they never play with the same dynamics as when they listen to their own music without headphones in a natural way. Without headphones, they are much more sensitive to dynamics. They react to each other much better.

EM: *What about using digital reverb and devices like the Lexicon that create the rooms for you?*

CP: Most of these units have nice reverb programs for the ear. But it's very rare that you get a unit programmed that way where you can feel the room.

I just bought a unit by a German engineer called a Quantec, and his intention was to get a real room quality out of this unit. When you listen to it you immediately have a room feeling. You can change the parameters of the room. This seems to me now the most true sounding unit.

A room situation is an objective situation. It gives you something you'd find naturally so it's less disturbing. It's also an experience with the ear. A good example is the echoes that Elvis Presley used on his first recordings. They were perfect, because they matched the idea of the music so much. It also created a sound, this typical rock and roll sound that lasted for a long time. I think it comes from those moments of singing in a bathroom. It's a feedback process. Each echo is a feedback and the excitement process of music in the brain is also a feedback process. It's attractive as a listening phenomenon.

All these echoes, reverbs and delays are involved in this feedback idea. A guitar feeding back with an amplifier is also really powerful. It's like the experiments with biofeedback in the late-60s. They invented little machines where you had a headphone and and a detector on your brain and the alpha waves come out of the brain and you get a tone. It assures the brain that it's there and it creates a weird feedback process from inside the brain to outside the brain.

EM: *The records that you produce are adventurous variations on rock themes, especially those in the last five years or so. Your own music tends to be more abstract. Are you getting out a lot of things that you can't do in your other productions?*

CP: It's like a playground where I can be free. To be honest, more than half of what I do in this free time is crap and I have to throw it away. But sometimes a beauty comes out of this and it's a free situation where you take an element and get inspired by it. It's a meditation process. I don't want to write a piece of music that's like a song. It may turn out that way, but it starts as a free expression and I bring it into order.

I'm more in the function of a medium and not as a creator who has a character and impresses this character on every note. I'm not a musician. I'm a medium between musicians, sounds and tape. I'm like a conductor or traffic policeman.

EM

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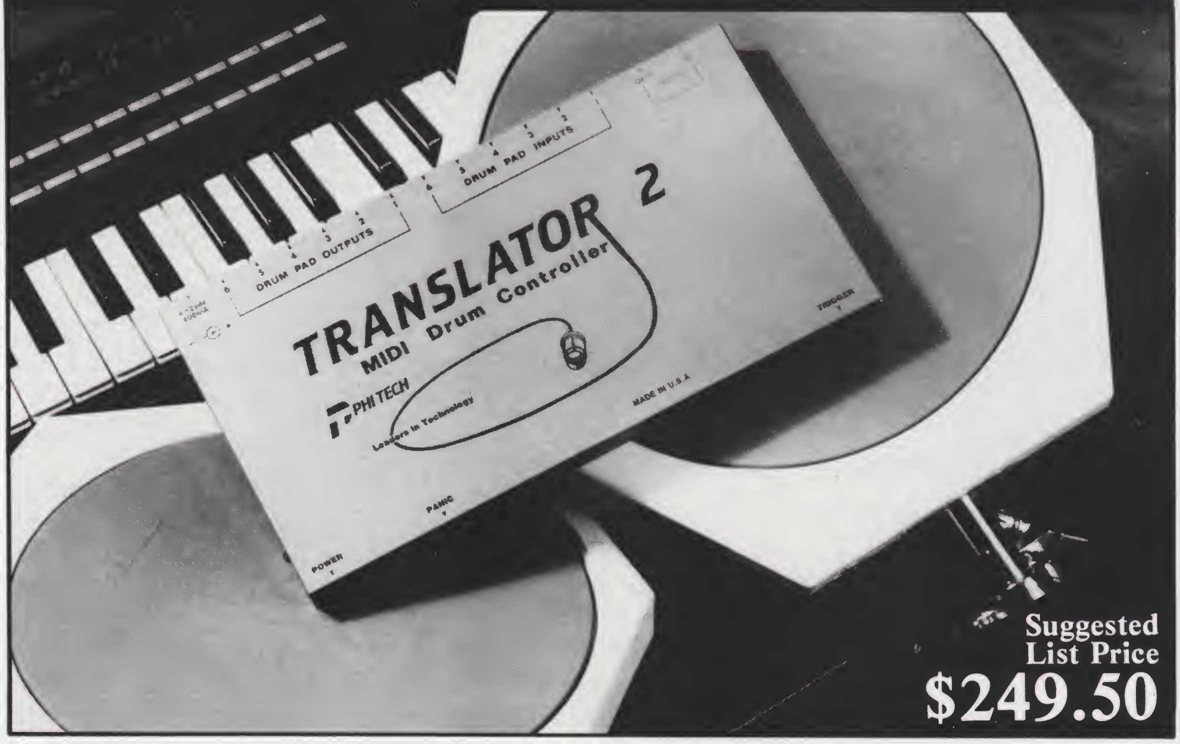

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Digital drum sounds are everywhere. Now with a few parts, a few hours of your time, and some electronics savvy, you can build your own digital drums and save money too.

Build the Alpha Digital Drum

BY HOWARD W. CANO

Electronic drum sets with digitally-sampled sounds are currently the "hot" item for percussionists. Electronic drums weigh less and are much smaller than their acoustic counterparts, don't require the hassles or expense of microphones, and in the studio, assure a clean sound with no isolation problems.

If you'd like to get in on the fun, the Alpha digital drum—which plays real, digitally sampled sounds—can be built for less than $40. A variety of sounds are available on EPROM (see parts list); if there is sufficient interest, we'll describe how to record your own sounds in EPROM in a subsequent issue. The Alpha is tunable over three octaves, fully dynamic (touch sensitive), and can be triggered from sensors or pads. The parts are common and easy to obtain.

HOW IT WORKS

Referring to the schematic (**Fig. 1**), the circuit consists of eight basic blocks: peak detector, envelope generator, trigger comparator, voltage-controlled oscillator (VCO), counter, memory, digital-to-analog converter (D/A), and voltage-controlled amplifier (VCA).

The peak detector is built around IC1A (¼ of an LM324 single-supply quad op amp) and a few discrete components. VR1, the sensitivity trim pot, attenuates the transient signal generated by the pickup (a piezoceramic disc); the signal then couples into IC1A's non-inverting input through R1. R1 and D1 protect the op amp input from negative-going signals.

PARTS LIST

Integrated Circuits

IC1	*LM324 quad op amp*
IC2	*CA3080 transconductance op amp*
IC3	*CD4046 CMOS phase-locked loop*
IC4	*CD4040 CMOS 12-stage binary ounter/divider*
*IC5**	*2732 4K × 8 EPROM*
IC6, IC7	*CD4049 hex inverter*

Resistors *(¼ watt, 5% tolerance except as noted)*

R1,7,12,19	*220k*
R2,11,18	*10k*
R3,13	*2k2*
R4	*1M*
R5,9	*22k*
R6,21,22,23	*4M7*
R8	*150k*
R10,16,17	*100k*
R14,15	*4k7*
R20	*470k*
R24,25,26	*1M2*
R27-35	*301k ¼ watt 1%*

Capacitors *(16 working volts DC)*

C1,7	*4µ7 radial lead*
C2,6,8,9-13	*100n ceramic disc*
C3	*3n ceramic disc*
C4	*470p ceramic disc*
C5	*10n ceramic disc*

Semiconductors

D1	*1N34A germanium signal diode*
D2,3	*1N914 or equiv. silicon signal diode*

Potentiometers

VR1	*500k trimpot*
VR2, VR3	*100k linear taper*

Sensor

Piezoceramic disc, approx. 1-inch dia.; Radio Shack #273-069, #273-064, or equivalent.

**The following sound EPROMs are available for $5 each from Howard Cano, 7057 Vivian Ct., Arvada, CO 80004: Snare, studio snare, high tom, mid tom, low tom, kick, studio kick, cow bell, wood block, or hand clap. An etched and drilled printed circuit board is available for $10. Include $1 postage per order.*

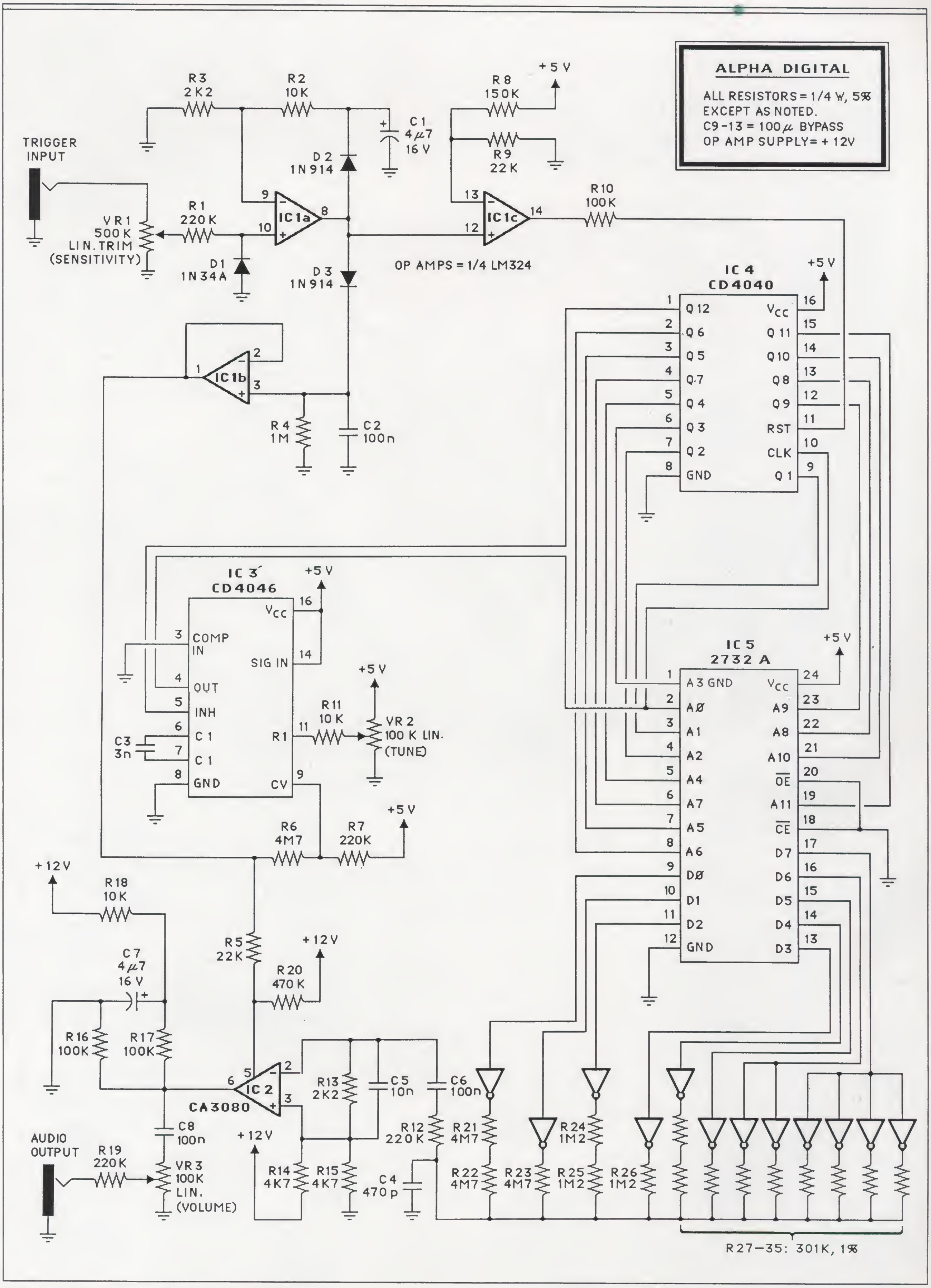
ALPHA DIGITAL
ALL RESISTORS = 1/4 W, 5%
EXCEPT AS NOTED.
C9-13 = 100µ BYPASS
OP AMP SUPPLY= + 12V
TRIGGER INPUT
VR1 500K LIN. TRIM (SENSITIVITY)
R1 220K
D1 1N34A
R3 2K2
R2 10K
C1 4µ7 16 V
D2 1N914
D3 1N914
IC1a
IC1b
IC1c
R8 150K
R9 22K
+5 V
R10 100K
OP AMPS = 1/4 LM324
R4 1M
C2 100n
IC 4 CD4040
Q12 Q6 Q5 Q7 Q4 Q3 Q2 GND
VCC Q11 Q10 Q8 Q9 RST CLK Q1
IC 3 CD4046
COMP IN
OUT
INH
C1
GND
VCC
SIG IN
R1
CV
C3 3n
R11 10K
VR2 100 K LIN. (TUNE)
R6 4M7
R7 220K
IC 5 2732 A
A3 GND A0 A1 A2 A4 A7 A5 A6 D0 D1 D2 GND
VCC A9 A8 A10 OE A11 CE D7 D6 D5 D4 D3
+12V
R18 10K
C7 4µ7 16 V
R16 100K
R17 100K
R5 22K
R20 470K
IC 2 CA3080
C8 100n
AUDIO OUTPUT
R19 220K
VR3 100K LIN. (VOLUME)
R13 2K2
C5 10n
C6 100n
R12 220K
R14 4K7
R15 4K7
C4 470 p
R21 4M7
R22 4M7
R23 4M7
R24 1M2
R25 1M2
R26 1M2
R27–35: 301K, 1%

Fig. 1 *Circuit diagram for Alpha Digital Drum*

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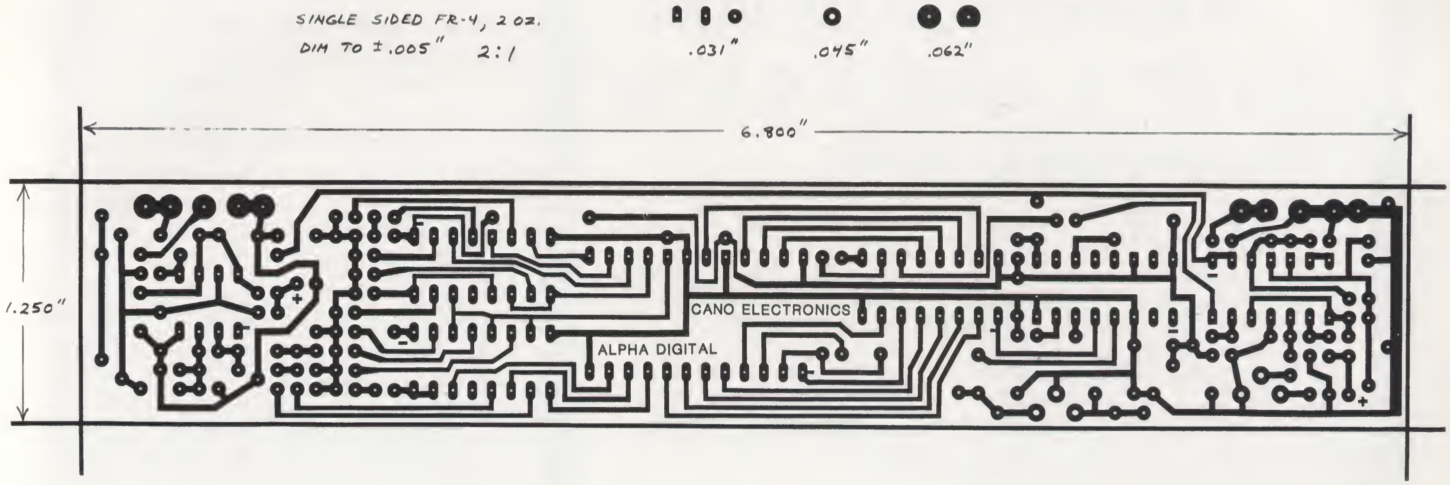
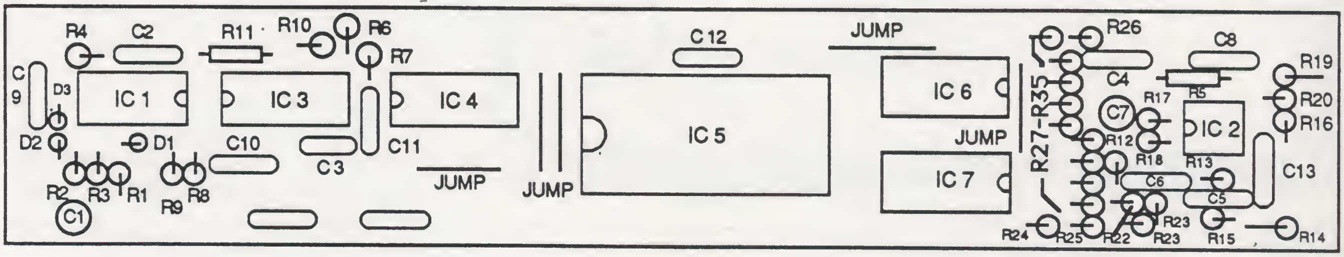


Fig. 2 *(above): foil side of Alpha Digital Drum PC board.* **Fig. 3** *(below): parts placement.*



IC1A charges C1 through D2 during the input signal's positive-going peaks until both inputs of IC1A are at the same instantaneous potential. C1 holds this voltage during more negative input signals. The charge slowly bleeds away through R2 and R3; this particular choice of resistor values also gives the peak detector some gain.

When IC1A swings positive, it also charges C2 through D3. These components, along with R4 and IC1B, form the envelope generator. It may seem redundant to have two RC networks, but it is necessary. The shorter time constant of (R2 + R3) × C1 permits the peak detector to respond to rapid playing, such as a drum roll, and the longer time constant of R4 × C2 doesn't cut short the longer drum sounds—yet still reacts quickly enough to give a good dynamic response. ICB1 buffers the exponential envelope and drives the control input of the VCA (IC2 and associated components) through R5. The envelope, attenuated by R6 and R7, also modulates the VCO (IC3) so that striking the sensor harder increases the frequency slightly, thus giving a more natural sound.

IC3, a 4046 phase-locked loop, serves as the basis of the VCO. VR2 tunes the sampled sound's pitch over more than three octaves. The inhibit input (pin 5) gates the oscillator on and off. Other sections of the 4046 are not used.

IC1C is the trigger comparator. When the output of the peak detector goes more positive than the reference voltage set by voltage divider R8/R9, this comparator resets the 4040 12-stage binary divider. R10 protects the 4040's reset input, as IC1C can swing higher than the 5V supply used on the 4040.

When the counter (IC4) is reset, Q12's output goes low and enables the VCO (IC3). The VCO clocks the counter, and the counter sequentially recalls the digital sound samples stored in memory chip IC5, a 2732 EPROM. The samples are read out of memory until counter output Q12 goes high. The VCO is then inhibited, and remains so until the sensor is struck again. The counter may be reset at any time during this sequence by multiple sensor strikes.

The D/A converter, which consists of two 4049 hex inverters (IC6 and IC7) and a binary weighted resistor string (R21 through R35), translates the 2732's digital data into an analog voltage. C4 and C5 filter out high frequency hash and clock glitches from the analog waveform.

The D/A feeds the VCA through an attenuator (R12 and R13), as the CA3080 is susceptible to overload. The CA3080 is a transconductance amplifier whose output current is proportional to the differential input voltage multiplied by the control current flowing into pin 5. The ratio of R16 and R17 sets a bias voltage for the CA3080 output, and their parallel resistance (along with VR3) determines the VCA gain, which is set just low enough to avoid clipping. R18 and C7 keep power supply noise out of the audio output. C8 couples the output signal to volume control VR3. R19 permits multiple drum outputs to be paralleled if no mixer is available; however, if you're feeding a typical PA or recording mixer, it's probably better

---

***Howard Cano** is an electronics engineer and currently designs high accuracy laboratory equipment. He has manufactured several types of musical equipment; his "Modulus Electronic Drums" are played and endorsed by Ed Shaughnessy on the NBC Tonight Show. His hobbies include playing guitar and other instruments, flying radio-controlled airplanes, and driving red sports cars.*

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to lower the value to around 10k. R20 helps overcome the 0.6V diode drop at the control pin input, which would otherwise cause a "dead" spot in the drum response at low dynamic levels.

CONSTRUCTION NOTES

IC5's pinout allows for a single-sided printed circuit board layout (see **Fig. 2**, the circuit board foil artwork). The diodes stand banded-end up, and most of the resistors stand on end to save space (see **Fig. 3**, component layout). Even so, construction is not particularly tight or difficult. . . just keep an eye out for solder bridges.

I strongly recommend using sockets on all ICs. A socket on the EPROM is, of course, mandatory if you want to change sounds—a ZIF (zero insertion force) socket is best here.

The circuit requires +5V at approximately 75 mA and +12V at approximately 3 mA. There is room on the board for a 5V regulator, which with proper heatsinking could run five or more drums. The +12V must be well-filtered, but not necessarily regulated. The analog and digital grounds should be kept separate and tie together only at the power supply.

VR1, the sensitivity trim pot, can mount on the board or go someplace more accessible if you anticipate using different types of triggers.

The piezoceramic sensor may be mounted in or on a practice pad, acoustic drum, or even a thin piece of plywood with rubber on top. Place the sensor where it won't take a direct impact, and use shielded cable between the sensor and circuit board. Pickup phasing is normally not important. If your particular sensor pad construction doesn't give quite enough output, you can increase the peak detector gain by reducing R3's value (halving R3 gives about twice the gain).

USING THE ALPHA DRUM

To use the drums for practicing or playing a small gig, you'll need an amplifier with at least 100 watts RMS of power. For proper reproduction, most drum sounds require excellent bass and transient response from the amp and speaker system. The Alpha drum output is line level, so pad it down if you're using a guitar amp.

Although most people think of digital drums as pretty high-tech, they're not really all that difficult to build. So grab your soldering iron and have fun! EM

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More Questions and Answers

BY ALAN GARY CAMPBELL

Q. *You're not going to believe this, but when I connect a MIDI cable from my CZ-101 to my Polaris, I get a ground loop! According to the MIDI spec, that's impossible! It only happens when I use Radio Shack DIN cables—what's wrong with the cables?*

A. The *MIDI Specification 1.0* and the *Detailed MIDI Specification* indicate that only the center three conductors of each five-pin DIN connector are to be utilized; the other pins should be *unconnected.* In MIDI cables, the center pin (pin 2) connects to the cable shield, and the lateral pins (pins 4 and 5) connect to the MIDI current-loop send and receive. The shield connects to chassis ground only at MIDI Outs and Thrus, and the current loop connects only to an optoisolator at the MIDI Input, thus precluding formation of ground loops.

So far, so good. But, five-pin DIN connectors actually incorporate *six* contacts—the sixth is the *case contact* that connects to the DIN plug body. With PC-mount jacks, it's common engineering practice to connect this contact to the ground plane of the device it plugs into (this is out-of-spec with regard to MIDI 1.0, but engineers do it anyway, from habit). With panel-mount jacks, the contact is inadvertently connected to the chassis ground just by bolting the metal-cased jack to the panel.

None of this makes any difference with MIDI spec cables, since the plug-case contact is unconnnected. However, Radio Shack and similar DIN cables are designed for audio applications, not MIDI, and attach the cable shield to the case contact at both ends. When such cables are used with MIDI gear that internally connects the DIN plug body contact to ground, *voila*...instant ground loop!

One solution to this problem is to open up the offending unit, and use an X-Acto™ knife to cut the PC board trace connecting the case contact to ground. However, a better solution is to simply use MIDI spec cables in the first place. Besides, Radio Shack and similar cables have the decided disadvantage of having the cable shield connected to the wrong pin, thus rendering the shield virtually useless; and such cables have considerably higher capacitance per foot than MIDI spec cables, which can cause data distortion. MIDI spec cables should contain a single low-capacitance, twisted, shielded pair, and should be as short as possible.

Q. *My CZ-1000 is out to lunch! I left the batteries out for a couple of weeks, and when I installed new ones, I couldn't get the P-button to re-load the Internal programs into RAM. The Internal programs seem to access the Preset programs instead, except for Nos. 14-16, which contain "garbage." Also, the pitch-bend doesn't work properly—the display shows a range of "99," and when I move the wheel all the way forward or back, the CZ's audio output disappears. Help!*

A. It seems likely that you have dirt or oxidation on the P-button contacts, or a cold solder joint. Remove the batteries, open up the '1000 and reheat the solder joints that attach the P-button components to the MA1M board; add a small amount of fresh solder, and take care not to allow the contacts to shift position during soldering. Next, clean the contacts with a miniature relay-contact burnishing tool (GC part no. 9338) and/or spray the contacts with a *minute* amount of Radio Shack *TV Tuner & Control Cleaner & Lubricant* (part no. 64-2315). Close up the unit and reinstall the batteries; turn on the CZ and try the P-button.

In general, these procedures will solve P-button problems. If the unit still won't initialize, try replacing the diode connected to the rear P-button contact (refer to a CZ-101/1000 Service Manual). Use an oscilloscope to monitor Pin 2 of the 74HC-241 Tri-State Buffer (lower left-hand corner of the board); you should observe a strobe when the P-button is pressed. If there is no activity on the pin, and you're certain that the P-button and diode are functional, replace the 74HC241. Note: most ICs in the CZ are not socketed, and must be carefully desoldered with appropriate desoldering equipment. If at any point the troubleshooting procedure becomes more involved than you care to deal with, refer the service to a qualified technician.

Q. *I'm having trouble finding the Casio AD-5 adapter for my CZ-101. None of the dealers in my area stock it. I tried an off-brand 9V adapter rated at 850 mA, but it produced an annoying hum in the audio output. I'm interested in building the regulated supply in the "CZ Mods" article (August '86* **EM**), *but I wonder if there's a simpler design to power just the CZ?*

A. The AD-5 is frequently difficult to locate, as is the RA-3 RAM cartridge; dealers seem to understock Casio accessories. However, as I mentioned in "CZ Secrets" (March '86 **EM**), accessories *only* (not instruments) may be ordered directly from Casio. With regard to the adapter

---

***Alan Gary Campbell** is owner of Musitech,™ a consulting firm specializing in electronic music products.*

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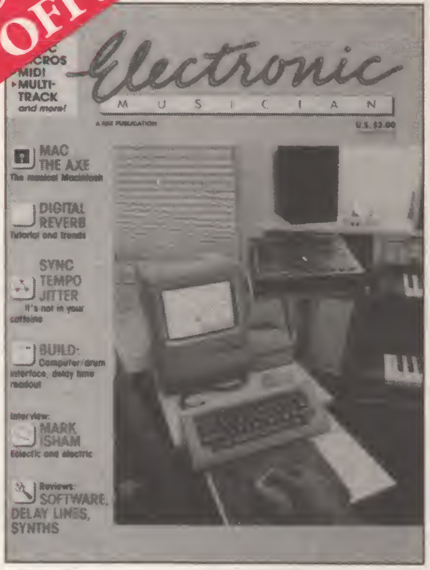
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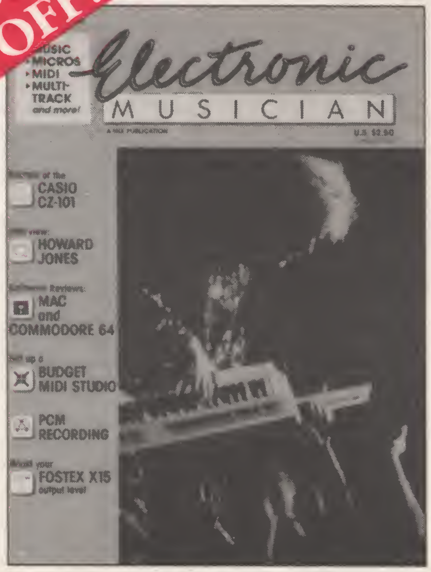
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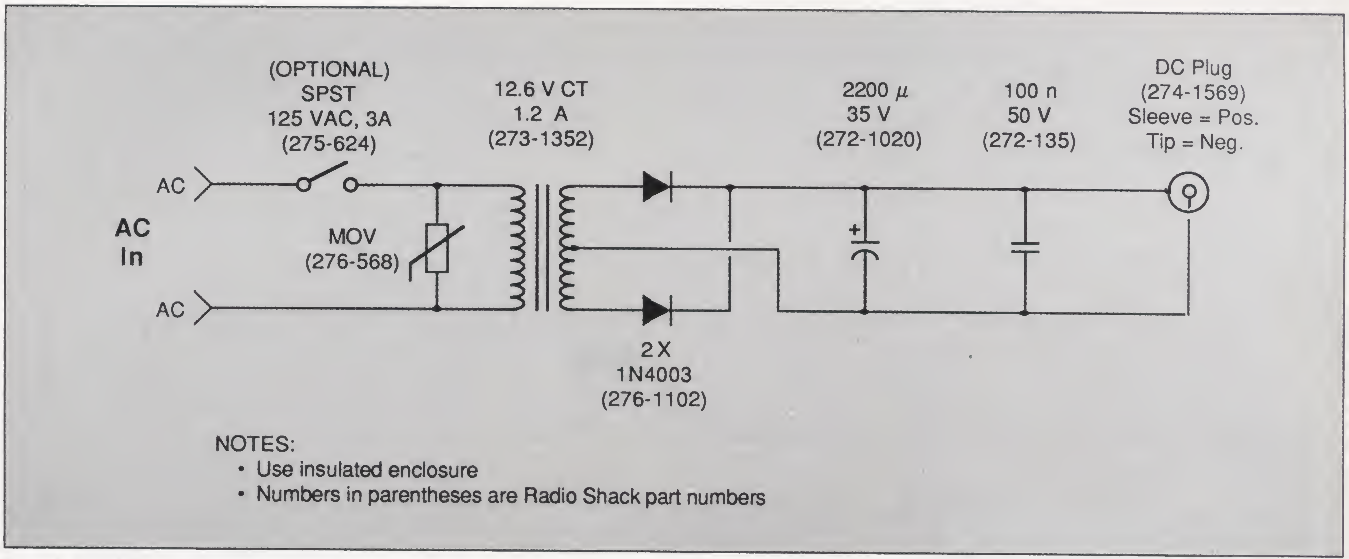

Fig. 1 *CZ-101/1000 unregulated power supply*

hum problem, inexpensive adapters are often very non-conservatively rated, such that at full output current they pass a considerable amount of 60 or 120 Hz ripple, which causes the "hum." (One solution for this is to add additional supply filtering or regulation inside the CZ; but since off-brand adapters are prone to premature failure, it seems like an unwise investment of time and effort.) Keith Robinson, Service Technician for Casio's E.M.I. Division, reports that his department is currently evaluating second-source adapters for the CZs.

With regard to making a supply yourself, aside from constructing just the positive "half" of the regulated supply (as mentioned in "CZ Mods"), **Fig. 1** shows a minimum-parts-count, unregulated supply, with onboard surge suppression. **CAUTION: THIS CIRCUIT INCORPORATES HAZARDOUS AC LINE VOLTAGES—IT IS *NOT* A BEGINNER'S PROJECT. OBSERVE PROPER SAFETY PRECAUTIONS AT ALL TIMES. If you are in any way unsure of your ability to construct this circuit, refer the work to a qualified technician.**

All of the components are available from Radio Shack—the appropriate part numbers are listed. It's probably best to construct this circuit in a non-conductive plastic or bakelite box. Use perf board or terminal strips to mount the discrete components. Note: this supply is unregulated, so it's really not suitable for powering ancillary devices—just the CZ.

Q. *When using the stereo outputs on my Yamaha RX11 drum machine, instruments that are panned right or left sound considerably softer than those that are "centered." This is most noticeable when I send the left and right outputs to my mixer that feeds the PA. Is this is software bug?*

A. Not really. Often, drum machine output functions do not fully compensate for the apparent level shifts when panning. Most likely, you've set the affected RX11 instrument sounds to the same or similar levels in software. Each of the mixer inputs—i.e., left and right—has the same gain (assuming that you're running the RX11 outputs into the auxiliary line inputs of your mixer, or into two mixer channels with the volume and EQ of each set identically), so sounds that are panned will see the gain applied only once, but sounds that are centered will see the gain applied *twice* —once for each input. At some point in the system, the acoustical output of the two channels will be mixed. You'll hear this in stereo amplification when sound from the left and right speakers mixes in the room. Under certain conditions of instrument level, panning, input gain, and output monitoring, the centered sounds can seem much louder. The simplest solution for this is to readjust the RX11 instrument volumes in software, assuming that the available resolution is sufficient. Otherwise, you'll need to use an external stereo sub-mixer to pan and pad the individual instrument outputs.

Q. *I have a Roland SH-101 with a key (G#2) that goes dead periodically. I've had a service center clean the key contact, but this only solves the problem for a few months or so, then it recurs.*

A. The SH-101, like many late analog and hybrid synth designs, uses a membrane-switch-type keyboard, rather than J-wires or similar contact schemes. In this design, each key presses down on a rubber carrier membrane segment, underneath which is mounted a conductive carbon button (**Fig. 2**). The button contacts a PC board under the keyboard, and electrically bridges a gap between two copper conductors, thus providing an SPST momentary-contact switch action. The low mechanical resistance offered by the components is intended to yield a long service life. The membrane theoretically provides a gas-tight seal for the bare copper traces, protecting them from dirt and oxidation; and the button provides a "self-wiping" contact action.

However, in actual use, the membrane is attacked by contaminants in the air, especially ozone and positive ions produced by fluorescent lights, resistance heaters, and electrical appliances. At some point the membrane may "dry out," and become brittle, or shrink. When this happens, the membrane can no longer provide a good seal for the PC board beneath it, and the board contacts are then subject to contamination and oxidation, especially those contacts near the ends of each membrane.

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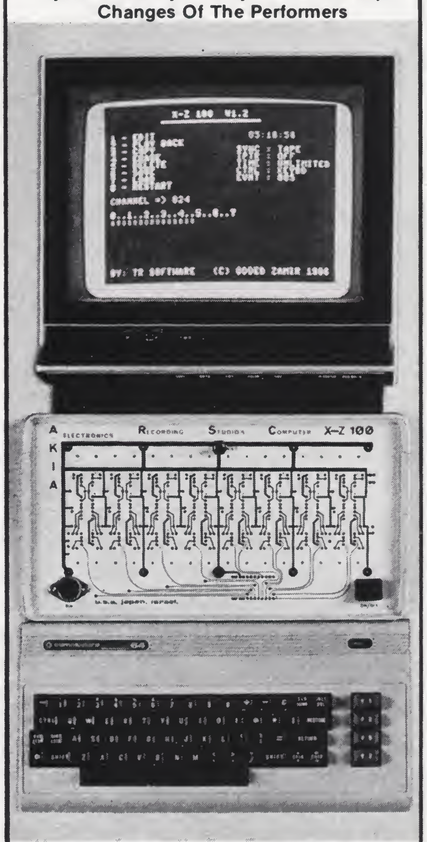
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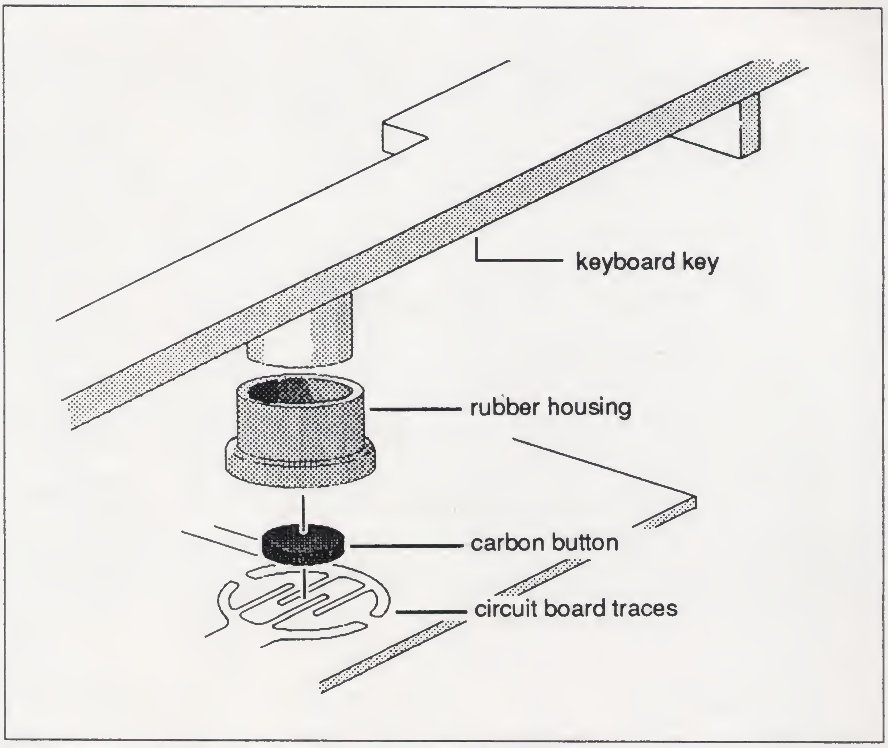
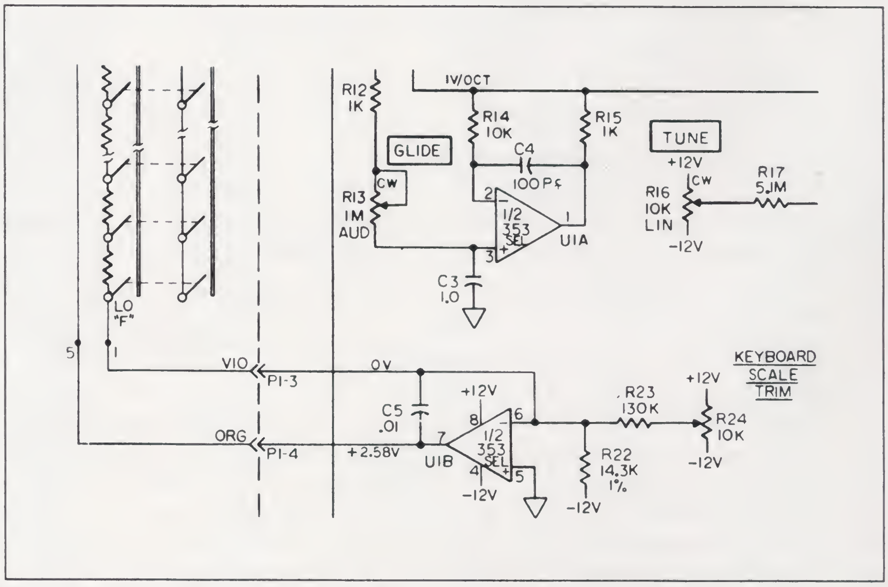

keyboard key
rubber housing
carbon button
circuit board traces

Fig. 2 *Exploded view of membrane-switch type keyboard. Normally the button sits in the rubber housing, a fraction of an inch above the board traces. Pressing down on the key pushes the carbon against the circuit board, thus completing the connection between the two traces.*

With regard to the SH-101 keyboard problem, the symptoms are a dead giveaway—the G#2 key is at the top end of the lower of two membrane carriers beneath the keyboard. The problem is relatively easy to fix: disassemble the unit and remove the keyboard (refer to the service manual). *Gently* peel off the self-adhesive clear plastic strip, under the keyboard assembly, that locks the keytops in place; work slowly and take care not to damage this part—it must be reused. Remove the G2 and A2 keytops, then the G#2 keytop. Gently raise up the carrier membrane at the G#2 position. Clear the contact area of dust and debris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10K
R15
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GLIDE
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R13
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6
7
U1B
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-12V
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R22
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1%
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R24
10K

Fig. 3 *Moog Rogue keyboard sample/hold circuit*

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by spraying with a short burst of "compressed air in a can" (Radio Shack *Dust Remover Spray,* part no. 64-2325). Spray a small amount of Freon/silicone lubricant (Radio Shack *TV & Control Cleaner & Lubricant,* part no. 63-2315) on a clean Q-tip and gently wipe the G#2 contact button underneath the membrane; wipe the G#2 PC board contacts similarly. Apply a *minute* amount of Elmer's *Stix-All* adhesive (Borden part no. E-650) to the edge of the membrane carrier at the G#2 position, and press the membrane into place (make sure that no silicone lubricant has inadvertantly coated the mounting area; adhesive will not stick to silicone-coated surfaces). Replace the keytops and reinstall the clear plastic strip (add a few drops of Stix-All if the adhesion is weak). Reassemble and test the unit. This procedure is generally 100% successful, but it does make removal and future service of the membrane switches more difficult.

Q. *My trusty Moog Rogue is having problems. I'll be playing along and the pitch will go crazy, sweeping up and drifting several octaves. This occurs seemingly randomly, but more frequently when the unit is first warming up or after it's been on a while. I've cleaned the key contacts, and that's not the problem.*

A. These symptoms point to a thermally defective sample/hold capacitor, or the op amp buffer that follows it. **Fig. 3** shows the relevant portion of the Rogue schematic (this design is typical of analog synths in general); C3 and U1A are the cap and IC in question. To repair the unit, the appropriate PC board must be removed (refer to the service manual), and the affected components desoldered and replaced. The keyboard scale adjustment may have to re-calibrated after the repair, but often this is not necessary.

The sample/hold capacitor should be replaced only by a high-quality *polystyrene* capacitor of identical capacitance, voltage rating, and tolerance. Often, this cap must be ordered from the manufacturer. The op amp may be available locally; in any case, it should be replaced with the *exact* same type. If the schematic lists the IC as "Selected," it means that the manufacturer has screened the part for low-offset or some other important characteristic. It is advisable to order a selected part from the manufacturer; but a locally available part may perform adequately, depending upon the individual electrical characteristics of the IC in question.

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Sample/hold capacitors tend to have rather large values (680 nF to 1 μF), and require considerable heat to desolder from the board. Use of a professional desoldering station (Ungar 4000, or similar) is highly recommended; otherwise, damage to the PC traces may result. Care should be taken during resoldering as well, since the cap itself can be damaged by excessive heat. It is advisable to install a socket if the op amp is removed, to facillitate service and preclude further desoldering/resoldering should the replacement IC exhibit infant failure mode. Only the highest quality sockets (*AMP* brand, or equivalent) should be used in sensitive analog circuits.

Note that residue from solder flux can cause leakage currents and severe sample/hold drift in analog control circuits. The affected area of the trace-side of the PC board must be defluxed. **CAUTION:** flux remover spray is corrosive. It should only be used out-of-doors or in a well-ventilated area. Wear safety goggles when spraying, and avoid contact with the skin or clothing. Keep the spray away from the component side of the board—it can *melt* plastic parts, even when dry!

Remove the PC board from the unit. Spray the affected area with flux remover (Radio Shack *Rosin Flux Remover,* part no. 64-2324); hold the board upright (in a vertical orientation, not flat). Catch the liquid that drains from the board with some old newspapers, and discard these when dry. Flush the defluxed area with 100% TF solvent (Radio Shack *Cleaner Degreaser,* part no. 64-2322), and reinstall the board.

Q. *I have a Prophet 5 that contains a J L Cooper Patch 120 memory expansion. I want to have the Sequential MIDI retrofit installed, but the J L Cooper board is mounted in the space required by the MIDI board. Is there any way to modify the J L Cooper mod to mount in another location?*

A. It might be possible to extend the connecting cables of the Patch 120, and mount the board elsewhere; but the two retrofits might still be incompatible. Fortunately, the Prophet CPU board can be modified to provide the 120 programs without the J L Cooper board. All that is required is a 24-pin DIP socket, a 6116 Static RAM (400 nsec or faster), a 74C00 Quad NAND Gate, some wire, and proper installation. The RAM/socket mount in an unused location on the board, and the 74C00 "piggybacks" on another IC. (Additionally, the CPU requires new operating instructions to access the additional RAM, but these instructions are included in the ROMs provided with the MIDI retrofit.) Note: all three program banks must be saved to tape before removing the J L Cooper board, or the programs will be lost. These can, of course, be reloaded after the modification.

Sequential previously manufactured a memory expansion kit containing all the above components, complete instructions, and a replacement system ROM (non-MIDI—addressed the expanded memory only). While the kit is no longer available, photocopies of the installation instructions, *Prophet-5 Memory Expansion Installation Manual* (Manual No. TN1000-5), may be ordered from Sequential.

This seems an appropriate point at which to digress and report some info that doesn't quite fit into the Q & A format:

Readers have expressed interest in Casio's computer-based service-reporting system, as mentioned in the October *Service Clinic* (Sidebar: "How Casio Does It"), and wanted to know more about it. Well, this system was created by Ted Grier, Casio's Service Manager, and runs on *Casio* computers; Ted reports that it probably would not have been practical to develop otherwise. He also informed me that the system logs information on both warranty *and* non-warranty repairs—which is pretty comprehensive, to say the least.

Also, in *Operation Help*, November '86 **EM**, Doug c/o Space Station Studio, is desperately seeking a schematic for his Moog Prodigy. The *Prodigy Owners' Manual* (which also contains schematics) and *Prodigy Service Manual* are still readily available from: Moog Electronics, Inc., 2500 Walden Avenue, Buffalo, NY 14225. Never overlook the manufacturer as the first source for older service manuals.

And finally, several readers have inquired about the availability of Soundchaser SC-100 systems, as described in "The Musical Apple II" (October '86 **EM**). I have acquired two of these systems, one a dealer demo and one new in the box (this one has a hand-rubbed African walnut case). Both are complete with full warranty and will be sold at cost. Interested parties should contact me c/o **EM**.

Please note: Alan regrets that he cannot provide personal replies to questions he receives. However, he will try to answer selected questions in future Service Clinic columns.

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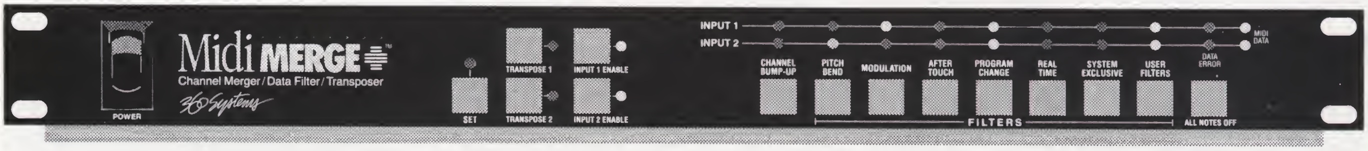
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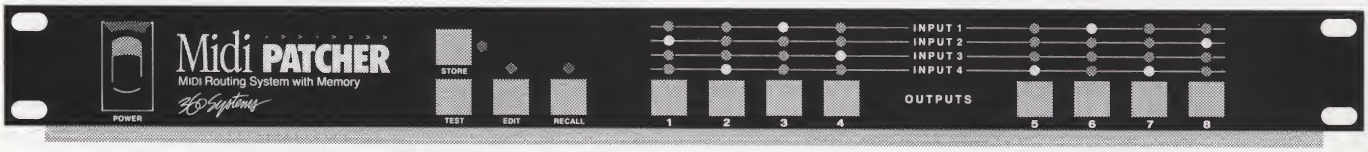
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The Slide Pot Ribbon Controller

BY C.R. FISCHER

In the book *Musical Applications of Microprocessors* (available from Mix Bookshelf, 2608 Ninth St, Berkeley CA 94710; 415/ 843-7901; write or call for free catalog), Hal Chamberlin describes the basic design and operation of a ribbon controller (see sidebar). He also mentions that a linear (slide) pot is mechanically similar, so I wondered if there might be a way to convert the inexpensive and readily available slide pot into the much more expensive and harder to find ribbon controller. As I already had a few surplus slider pots sitting around, I dissected a couple to see what could be done. As it turned out, a slide pot can serve very well as a quick-and-dirty ribbon controller.

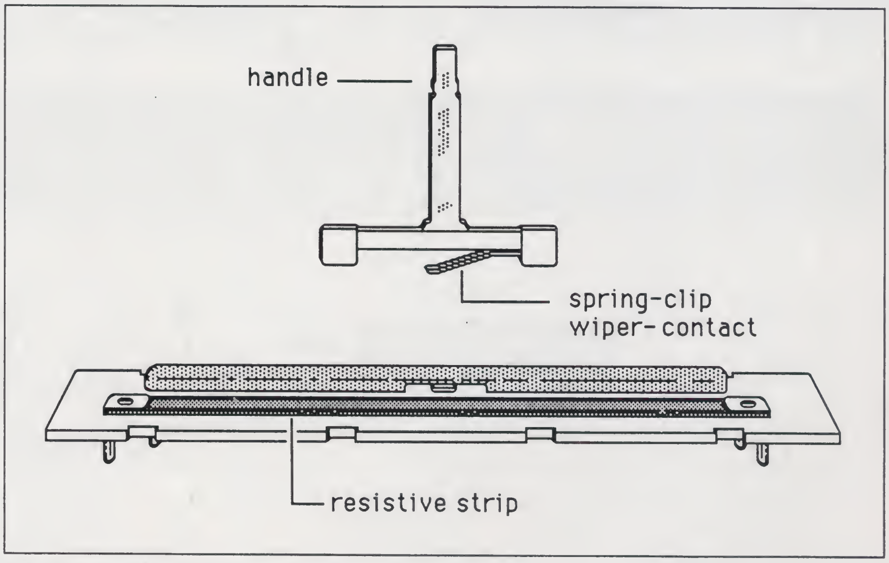

Fig. 1 *A simplified blow-up of a linear potentiometer*

Fig. 1 shows an exploded view of a slide pot. A strip of carbon or similar material serves as a resistive strip. Metal contact clips, which fulfill the same function as the lugs on a rotary potentiometer, connect the ends of the strip to the outside world. The spring on the handle performs a dual purpose; it presses the handle against the case for mechanical inertia, and provides electrical contact between the resistive strip and the metal wiper. (Note that different slide pots may implement this differently. For example, the handle might have brushes that contact the resistive strip, and a spring that serves solely to provide mechanical inertia. Or, the brushes themselves may be made of a springy material.) The resistive strip forms the basis of our ribbon controller-to-be.

The basic idea is to drive the strip with a constant-current source, thereby providing a constant, linear voltage drop across the resistive strip. Thus, contacting the strip at various points along its length with a wiper will produce a varying voltage, depending on the point of contact. **Fig. 2** shows the constant-current source (based around Q1, R1, C1, R3, and Z1) and an op amp buffer (IC1); the latter prevents the circuit from being loaded down by subsequent stages. R3 sets how much current is pumped through the resistive strip, which sets the voltage scaling. Remember, according to Ohm's law, voltage equals current multiplied by resistance. Therefore, for a constant resistance, increasing the current increases the voltage drop across that

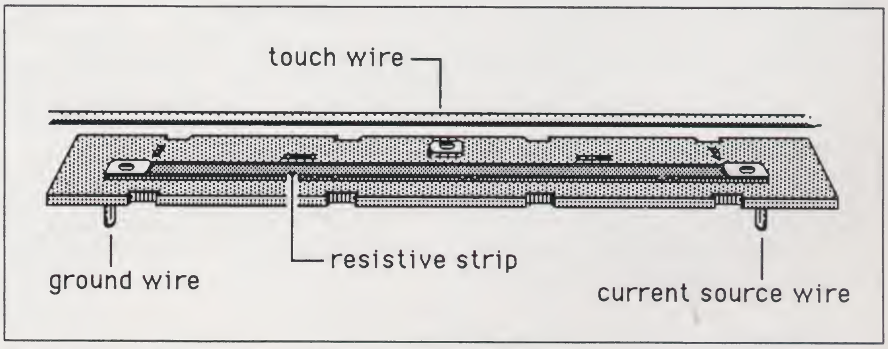

Fig. 2 *The basic layout for a ribbon controller*

C.R. **Fischer** *has written for several magazines (including* Modern Electronics *and* Radio-Electronics*) and runs* Mescal Music, *a custom electronics design service. He also plays synthesizer for* The Caste, *an east San Francisco Bay gang of musical troublemakers.*

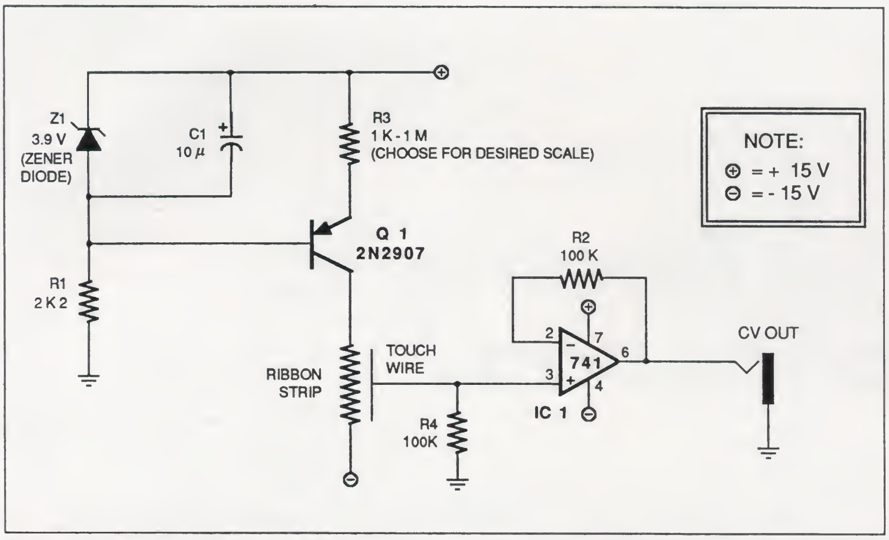

Fig. 3 *Controller schematic: Q1 forms a constant-current source to drive the strip; the resistor should be chosen for the desired full-scale output. The OpAmp buffers the touch-wire to eliminate loading effects and may be a 741 or similar device.*

resistance.

I used the slide pot's metal wiper strip (which should be covered with felt, adhesive plastic, or whatever to prevent the performer's body from affecting the electrical characteristics of the circuit) as a contact for the resistive strip. The metal wiper is suspended a short distance above the resistive strip, so pushing down lightly on the wiper allows contact between the wiper and strip. If the slide pot you take apart doesn't work the same way as mine, any stiff yet bendable conductive material suspended above the resistive strip should work. Steel spring wire works well as a contact (see **Fig. 3**); you could even tie down one end of a guitar string, and connect the other end of the string to a tuning mechanism to vary the tension on the string. Just remember to insulate the "wiper" with some kind of material to prevent hum pickup or other interference as you touch the wiper.

While plenty of people have never heard of spring wire, it does just what we want and is available at better hobby and hardware stores. It's very stiff, and resists bending unless force is applied. It is available in several gauges, so that you can pick the size that feels good to you. Best of all, it's filthy cheap (less than 50 cents a yard) and solders very well.

Although this ribbon controller is inexpensive and not difficult to put together, the small surface area will limit its use to pitch bending and similar applications that don't require a wide voltage range. A larger controller might be assembled using multiple strips in series; or there may be other solutions out there somewhere. However, for those who want to start experimenting with ribbon controls, this is a simple and cost-effective place to start.

What's a Ribbon Controller?

The first Moog synthesizers, in addition to offering a keyboard for controlling pitch, also offered a ribbon controller. This was a strip of long resistive material over which a taut metal band was suspended. Pushing down on the band would make contact with the resitive material, thus allowing the performer to pick off different voltages depending on the exact point of contact. These voltages could then be sent to voltage-controlled modules; for example, to control pitch, the voltage output would go to a voltage-controlled oscillator (VCO). The main advantage to a ribbon controller is that it allows "fretless" and microtonal playing, but it also provides for easy pitch-bending—simply slide your finger back and forth on the metal band to change the voltage going to the VCO.

Although ribbon controllers are not too common these days, the Yamaha KX5 remote MIDI keyboard incorporates a ribbon controller for pitch bending. This gives a very natural feel that is well-suited to the remote keyboard concept. —*Craig Anderton*

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> **"You can extend the shelf-life of quality batteries almost indefinitely by storing them in a zip-lock bag in the refrigerator"**

The Enercell Battery Guidebook

Technologists, technicians, hobbyists, and musicians alike have long needed a concise, accessible reference on battery technology. The number of battery types and styles in use today is mind-boggling—which one should you choose for a particular application? The *Enercell Battery Guidebook,* Radio Shack's newest technical paperback, promises help for the frustrated battery user.

The 156-page volume includes chapters on "The Basic Dry Cell Battery," "Factors That Influence Battery Performance," "Selecting the Right Battery," "Testing and Revitalizing Batteries," "Types of Batteries," "Nickel-Cadmium Battery Chargers," and "Guidelines and Specifications for Designers." Also included is a glossary of battery terminology, and 114 pages of technical data on Enercell-brand batteries.

The *Guidebook* discusses technical aspects of battery construction and operation, explains the chemical reactions involved, and supplies tabular data—common name, composition, cell voltage, capacity, rechargeability, impedance, shock resistance, etc.—that compares popular types. About the only thing missing is data on competitors' batteries, an understandable omission, especially since the given data *is* representative of batteries in general. My single quibble is with the book's weak introductory chapter, which might turn away potential readers. However, the *Guidebook* contains most of the who, what, when, where, how, and why of batteries, for a cover price of only $1.99. It is a welcome reference for the lab bench, in the studio, or on the road.

USE ALKALINE BATTERIES

Alkaline batteries should not be confused with Zinc-Chloride—so-called "Heavy Duty"—batteries, which are often packaged and even priced similarly, but offer comparatively inferior performance. Of course, Zinc-Chloride batteries and even common Carbon-Zinc "flashlight" batteries *are* useful power sources; but they're prone to leakage and self-depletion when left installed for extended periods, and are not at all shock-resistant. Such batteries should be used in electronic music applications only if inspected and replaced regularly. It's easy to neglect that disused phase shifter in the corner of the studio, until the El Cheapo batteries inside have turned to corrosive muck. Gear damaged by battery leakage can be expensive to fix, and it's one type of repair that can almost always be avoided. It's always good practice to remove batteries from a piece of gear if it's not going to be used for extended periods of time.

Most major battery manufacturers make alkaline batteries, and some make only this type. Duracell-brand alkaline batteries are often recommended by electronic musical instrument manufacturers, because these batteries have a reputation for extended shelf-life, high capacity, and resistance to leakage. My own shop experience bears this out: recently, while cleaning a storage area, I discovered several unopened packages of Duracell "C" cells with a 1979 date code; when tested, the cells were still good! Additionally, I've never known Duracell batteries to leak, even in gear that's been on the road constantly and exposed to extreme temperatures.

How about those free batteries you get with your Radio Shack Battery-of-the-Month Card? Well, those are inexpensive carbon types that tend to go flat rather

---

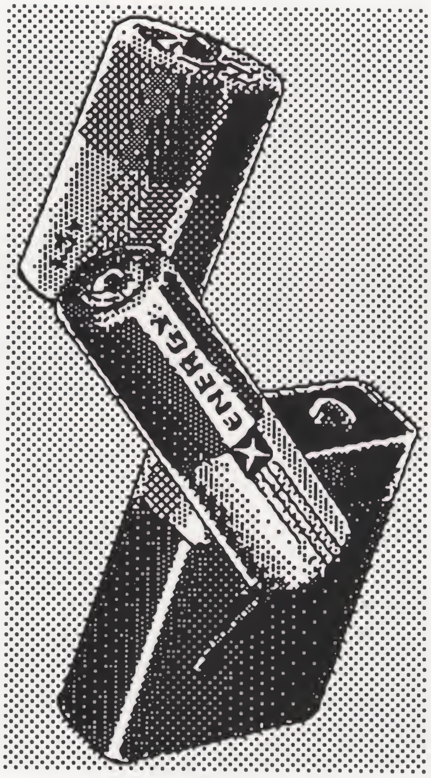
***Alan Gary Campbell** is owner of Musitech,™ a consulting firm specializing in electronic music product design.*

quickly, and can leak. It's probably best to relegate these to use as spares or emergency cells, and discard them after a year or more of storage.

You can extend the shelf-life of quality batteries almost indefinitely by storing them in a zip-lock bag in the refrigerator (*never* store batteries in the freezer), but you must insure that the terminals on any loose batteries, especially 9 Volt rectangular types, do not come in contact with a conductive surface and short out. Cover the terminals with electrical tape, if necessary.

LET'S LOVE OUR EARTH

Batteries are an important and necessary power source, but their manufacture uses up vital mineral resources, and their disposal pollutes the environment with potentially toxic compounds. **Batteries should *not* be used if other power sources are available.** Portable keyboards can be powered from an AC adapter, or from rechargeable batteries. Portables that convert to "strap-on" keyboards can often be modified to receive phantom DC power via MIDI or audio cables (a Casio CZ-101 MIDI/power cable modification was covered in "CZ Mods," August '86 **EM**—back issues available for $3). Some programmable portables let the batteries do "double duty"—i.e., power the unit *and* backup the program RAM. In this case, if the portable is normally powered from an adapter, there's no need for lots of large batteries just to back up the memory. These can often be replaced with one small battery (this technique was also covered in "CZ Mods").



Portables can be powered by solar cells. You can readily construct your own solar panel: select a solar cell type that is rated at about 1.5 times the current required, and wire enough of these in series to provide the voltage needed by the portable (it's wise to derate the cell output voltage about 20%, to allow some "headroom"). The completed cell array can be mounted on a piece of foam core, or similar material, and supported from a cardboard easle—or even slung from a backpack. Large 2-amp cells are sometimes available for as little as $2 from surplus outlets such as ETCO or John J. Meshna Co. (see DataBank). This is very cost-effective, given that a solar panel can replace both batteries and AC power, and may even be used indoors if the light is sufficiently bright. **EM**

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In another of our career-oriented articles, we take a look at opportunities in the music press.

Music in Publishing

BY PETER HIRSCHFELD

I was extremely hesitant to put this article together. I'm afraid that if people find out how rewarding it is to work on a magazine, **EM** might be deluged with resumes after this article appears! No, we don't have any positions available, but . . .

Working on a magazine gives you the opportunity to work directly with the products, people and companies that create an industry. At **EM**, we routinely get to play with some of the neatest new toys and technologies; many times we can meet and talk to some great musicians, producers and engineers. And it's great to be part of a very exciting industry.

The satisfaction of seeing the results of your efforts every month is also rewarding. Many jobs (especially in large droid-like corporations) never allow you to receive any tangible feedback; hundreds of hours of work will at best be rewarded by a tiny blip on somebody's analysis chart.

All right, what really happens behind the scenes at a magazine and how can you get involved?

The basic structure of a magazine consists of an *Editorial Department* that is responsible for the written contents, an *Art Department* that determines what the magazine looks like, a *Production Department* that takes all the information and puts it in a form ready for printing, a *Marketing/Sales Department* that sells the advertising, a *Circulation Department* that generates and services subscription, and a lot of related support staff. Coordinating the whole cacophony is the *Publisher*.

Of course, there is much more going on than presented above, but these are the basics.

The most accessible areas for getting involved with a magazine without specialized training (but you do need flawless knowledge of the music industry!) are Editorial, Marketing, and a category that I'll call General Help. Most other areas of publishing, such as the art department, require expertise in a particular area.

> **"What really happens behind the scenes at a magazine and how can you get involved?"**

The Editorial department is the most visible to the outside world. Every word that appears needs to be written, edited, and checked by someone. In large magazines, there are dozens of editors and writers to fill the pages. **EM** has two editors (Craig Anderton and Vanessa Else), an assistant editor (Tim Tully), and **EM**'s large family of freelance authors. Generally speaking, the best training for becoming an editor is to gain a lot of experience writing for magazines and have a good working knowledge of grammar and spelling. Note that most magazines will not consider hiring someone for an editorial position without writing experience.

Many specialized magazines, such as those serving the music and computer industries, do not have many full-time writers. If you are considering making a career of working on the editorial staff of a magazine, it is almost a prerequisite to start writing stories and get some stuff published; if you can't get anything published, you will find it difficult to get a job as an editor. However, there is an alternate route, which we'll discuss later in this article.

The magazine's Marketing department also presents opportunities if you have a good understanding of a particular industry. Within the boundaries of the Marketing staff lies the responsibility for generating advertising sales, as well as marketing the magazine itself—creating ads, promotions, and working with the Circulation department to gain readers and distribution.

Advertising sales is a challenging, enjoyable field, provided you have the confidence to talk to the president of an instrument or software company and have a thick enough skin to withstand rejection. How important are advertising sales? Consider this: the subscription price you pay for **EM** does not even cover the cost of printing and mailing the magazine every month, much less include the production and writing costs. The main income that keeps this magazine, and just about any other, arriving at your door every month comes from the sales of advertising. (For anyone who wishes that a magazine would not have ads, you would probably have to pay at least $50 per year to read it!)

Because the financial success of a magazine depends upon the sales ability of an advertising rep, it is not common to get a full territory with virtually no experience. The best way to break into a magazine's sales department is to get a job as a sales assistant, a junior ad rep (working with a senior rep in a territory), or work with the classified department of a magazine. These are all positions that an enthusiastic, intelligent person can obtain.

***Peter Hirschfeld** has (among other things) a Yamaha piano, a degree in nuclear chemistry, an MBA, a Chroma Polaris, and a dog named Mike. His programming of computers and synthesizers has led to his current research on fractals in music. He is also the Director of Marketing at* Electronic Musician.

Again, the best training for these entry-level positions is to know about the field in which you want to work.

The other functions of the marketing department (promotions, advertising, customer support, etc.) are excellent areas for people who have good ideas and writing skills. The most common entry positions are for marketing assistants, promotions manager, or various positions with titles such as coordinators. The best training for these types of positions is to develop very good basic communication skills and have the ability to take a project from start to finish.

The last and most accessible category of publishing is "General Help." The premise here is by taking *any* job within a magazine, you can learn more about the jobs you really want, as well as show your interest and ability in that area. For example, if you want to be involved in editorial, you might start off as a proofreader and become an editorial assistant. Or, a job as a circulation assistant could lead to a position in sales. By getting involved in a company you like, you are in the best position to land the best job.

> **"The best training for . . . entry-level positions is to know about the field in which you want to work"**

Before all of the musicians and computer enthusiasts dash off a letter and resume to every magazine, let me mention the negative points of publishing.

The biggest problem is *pressure.* Producing a magazine on time every month with a minimal amount of mistakes (both technical, such as typos, and strategic, such as picking articles people don't want to read) requires enormous dedication and concentration. You would not believe the number of opportunities for major mistakes to be made, and the variety of sources from which pressure occurs.

Another realization is that the primary business of publishing is publishing. Even with a music magazine, the emphasis is on "magazine." If the only motivation to work at a magazine is to get close to musicians and try to get that big contract, you will be quite disappointed. The majority of your effort must be devoted to getting a quality magazine out, and if you don't enjoy that prospect, look elsewhere for a career.

One other point is that different magazines have different "personalities" and work environments. A great job at one place might be unbearable at another. It really pays to investigate the particular working environment before making any assumptions.

That's the publishing business in a nutshell (or is it a nut house?) My closing comment is a reminder from our publishers that we don't have any positions open, so don't even consider sending us a letter . . . just kidding! We are always happy to receive letters from **EM** readers (although we really don't have any openings at this time, we will gladly keep letters on file for future jobs). **EM**

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Those old analog synths sound great, and you can pick them up for a song these days. The only problem is they aren't MIDI. . .but now you can do something about that.

Roland MPU-101

BY DEAN HEINBUCH

What? You're about to unload that old non-MIDI mono synth?

Before you do, check out the MPU-101 MIDI-to-CV (control voltage) interface from Roland. This box converts MIDI note-on commands into gates and control voltages that your mono machines will understand. With the MPU-101 you can control both modular and hard-wired one-Volt-per-octave synthesizers from MIDI master keyboards, MIDI recorders, and MIDI guitar interfaces.

At first glance, this 9- × 9-inch box looks like nothing more than a simple, one-function interface device. Look more closely, though, and you'll see a number of pleasantly surprising operating variations and sub-functions.

USES AND APPLICATIONS

The MPU-101 has three operating modes: Poly, Mono, and Special (Omni off is the default). It does not recognize MIDI mode messages, and Poly or Mono modes are chosen by function buttons. MIDI In, Out, and Thru sockets are on the rear panel.

In Mono mode, the MPU-101 assigns the MIDI channel of your choice to CV-Gate Output Set 1 (each set consists of a gate and a CV output—see sidebar). Data on the next three higher-numbered MIDI channels are assigned to CV-Gate Output Sets 2, 3, and 4, respectively. For example, if you select MIDI channel 9 in Mono mode, any data (note on/off, velocity, or pitch bend) sent over channel 9 goes to the first set of CV outputs. Data sent over channel 10 goes to the second set of outputs, channel 11's data goes to the third set, and channel 12's data goes to the fourth set. Thus the MPU-101 will assign one track and MIDI channel from a sequencer to each of its four CV outputs, and each output in turn will control one synthesizer. (**Fig. 1** demonstrates how two MPU-101s, both set to Mono mode, can support up to eight completely independent voices.)

Product Summary

Product: MPU-101
Type: Four channel MIDI-to-CV/gate converter
List Price: $425
CV Protocol: 1 Volt/octave
Operating Modes: Poly, Mono, and Special
MIDI ports: MIDI In, Out, Thru
Manufacturer: RolandCorp US, 7200 Dominion Circle, Los Angeles, CA 90040; tel. 213/685-5141.

As great a boon to non-MIDI synth owners as this function is, Mono mode is plain-vanilla compared to the fun offered from Poly mode. Poly turns the MPU-101 into a simple but effective MIDI data processing box.

Press any of the three Poly function buttons—2 voice, 3 voice or 4 voice—and the MPU-101 enters Poly mode with respectively 2, 3 or 4 CV Output Sets enabled for use. From Poly mode, a three-position Assign Mode switch assigns note messages to the CV-gate outputs, depend-

Roland
MIDI-CV INTERFACE
MPU-101

Dean Heinbuch is an amateur synthesist, guitarist, and part-time guitar teacher. He composes and records as often as possible in his home studio, The Ear Food Factory.

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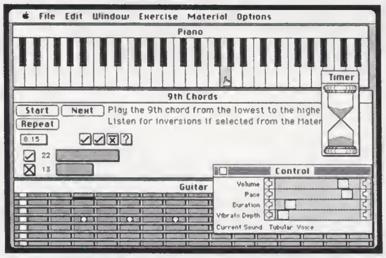
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ing in all cases upon how the notes are played.

In Assign Mode I, "Non-rotary Mode," imagine playing a chord or a legato series (i.e. don't release a note until the next note is played) of two to four notes. Each new note will appear at outputs 1-4 sequentially. Play one, two or three pedal tones in the lower registers, and a melody above that. The pedal tone(s) will be assigned to lower-numbered outputs (1, 2 and 3) while the melody will go to the next highest available output (2, 3 or 4). Add a DDL set to a long or short echo for even more fun.

In Assign Mode II, "Rotary Mode A," each CV output claims the note first assigned to it until it's forced to claim a new note. For example, if you play C, D, E and F, they'll go to CV outputs 1, 2, 3, and 4 respectively. Then play D, E, F and G. Outputs 2, 3, 4, will hang on to D, E and F, and output 1 will be forced to play G.

The logic of this function will dynamically change voice assignments among your mono synths as you play, thus rendering some curious and pleasant effects. The more you experiment, the better you'll understand this note assign logic, but interesting combinations will come regardless as you play with different patches and output assignments. The best effects—little "mini-sequences" within melodies or chords—often result naturally from experimentation.

Assign Mode III, "Rotary Mode III," is the simplest to use of the three modes and my personal favorite. There's no ambiguity here as each new note-on is sequentially assigned to a new Output Set. This mode also supports my favorite effect; it's simplistic and cliched, but I love it anyway.

Set your MIDI poly-synth to a vibraphone type sound and two non-MIDI mono synths to contrasting patches. Hook the mono synths up to Output Sets 1 and 2 (later try 3 and 4). Play a simple straight-eight rhythm at a moderate tempo, starting with the first B below middle C. The accents of the beat will change with the note assignments and give you

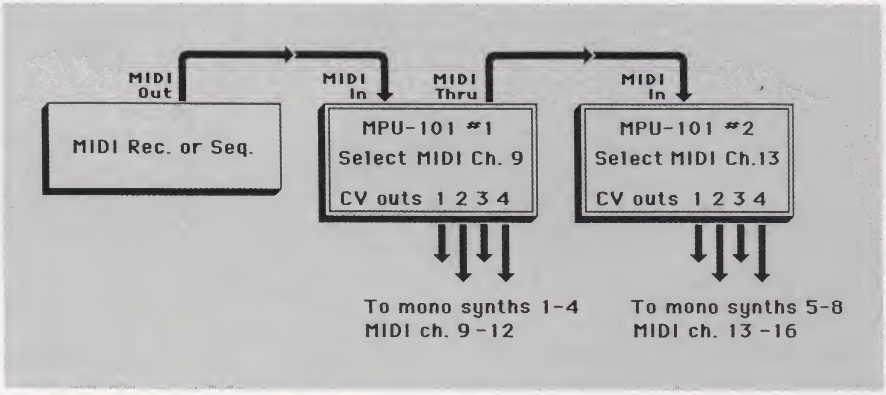
MIDI Out
MIDI In
MIDI Thru
MIDI In
MIDI Rec. or Seq.
MPU-101 #1
Select MIDI Ch. 9
CV outs 1 2 3 4
MPU-101 #2
Select MIDI Ch.13
CV outs 1 2 3 4
To mono synths 1-4
MIDI ch. 9-12
To mono synths 5-8
MIDI ch. 13-16

Fig. 1

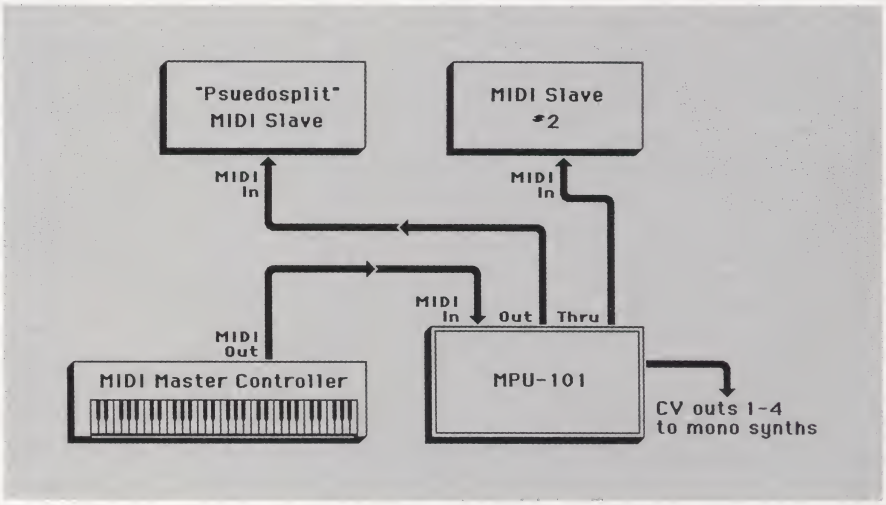
"Psuedosplit"
MIDI Slave
MIDI Slave
#2
MIDI In
MIDI In
MIDI In
Out
Thru
MIDI Out
MIDI Master Controller
MPU-101
CV outs 1-4
to mono synths

Fig. 2

> **"At first glance, (the MPU-101) looks like . . . a simple, one-function interface device. Look more closely, though, and you'll see a number of pleasantly surprising operating variations and sub-functions"**

some nifty counter rhythms.

Try the same rhythm with any three-note chord and a nice goofy melody will play over your chord changes. This set-up also demonstrates that you don't need a roomful of old synths to get useful effects from the MPU-101. In fact, the most interesting effects are found by using only one or two mono synths and trying different combinations of output Assign Modes and MIDI modes.

The third function mode for the MPU-101 is something Roland calls "Special Mode," which is a kind of "floating split" function with four variations. Play a chord in this mode and the highest note will be assigned to Output Set #1, the latest note to Set #2 and the lowest note to Set #3. The Assign Mode switch will additionally assign the highest, last or lowest note to Output Set #4.

The first three functions in Special Mode, "2 Voice," "3 Voice" or "4 Voice," are great for keeping unwanted bass notes from riding along with the melody. If the lowest note you play is higher than the previous note played by more than *one octave* (for "2 Voice"), an *octave and a fifth* (for "3 Voice") or *two octaves* (for "4 Voice"), the MPU-101 will ignore that lowest note, so the chords and melodies you play with the right hand will stay blissfully free of your left hand bass lines.

The fourth variation of "Special Mode" is a traditional split keyboard function. Press "Special" plus "Mono," and the MPU-101 ignores notes higher than middle C, or if you choose, any notes lower than middle C. By switching the CV Output Sets between two mono synths you can have both play only above middle C, both below middle C, or one above and one below.

Since output 4 will double any of the other three, this mode will "pseudosplit" a slave synth if the slave is a MIDI unit. To do this, connect the MIDI Out of the MPU-101 to the MIDI In of a slave synth. Since the note assigned to output 4 is also sent from the MIDI Out, any splits set up on the MPU-101 affect the slave synth. The catch, of course, is that the slave synth will only play one note at a time even if you play chords on the master controller. Note that you can also use the MPU-101's MIDI Thru so that a second

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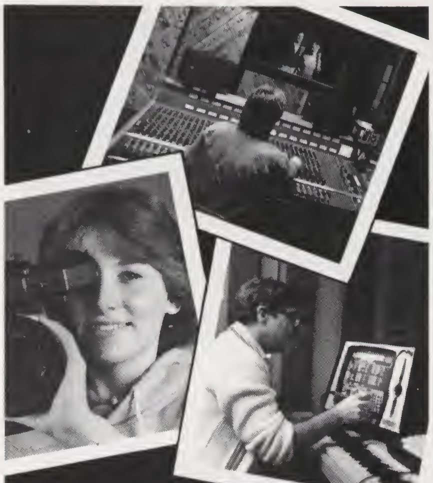

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Control Voltage Vs. MIDI

Prior to MIDI, the standard synthesizer interface protocol employed control voltages (CVs) and gates. Unlike MIDI, where a master controller sends out digital data to which a slave unit responds, a CV-oriented controller sends out discrete voltages that directly control the pitch of a voltage-controlled oscillator (VCO). The most common CV protocol is one-Volt-per-octave, where each one Volt increase in the voltage generated by the controller raises the pitch of a VCO by one octave. Therefore, each semitone change corresponds to a control voltage change of 1/12 of a Volt.

These control voltages only control pitch; it's up to the gate to turn notes on and off. Usually the gate controls an envelope generator, which controls a VCA to determine the overall instrument dynamics. When the gate turns on, which happens when you press a key, the envelope generator begins its cycle. When you release the key, the gate turns off and the envelope generator enters its release phase. Often a second envelope generator, also tied into the gate, controls the synthesizer's filter (VCF).

Although the standardization, and additional control, offered by MIDI has eclipsed CV-based systems, the older technology still offers many advantages. For one, alternate tunings are easy to implement. Also, custom controllers based on CV technology are simple to build, and a CV-based signal processing system can be far less expensive to build than the digital equivalent. Sound quality also enters into the picture. With MIDI, pitch bend and other knobs are usually quantized, which means that turning a control does not produce a smooth, continuous change, but rather, a series of discrete steps. Bending pitch rapidly over a wide range produces what some call "zipper noise"—a sort of glitching caused by rapidly going through these many discrete pitch steps. CV systems, due to their analog, continuously variable nature, do not have these problems and under many playing conditions provide a purer sound.

For a complete discussion on CV and gate based systems, see Chapter 1 in my book, *MIDI For Musicians.*

—Craig Anderton

slaved poly synth with MIDI will receive unaltered MIDI commands from the Master controller (see **Fig. 2**).

SUB-FUNCTIONS

Aside from the main functions, the MPU-101 boasts a number of useful sub-functions. The first of these, "MIDI-Trigger Interface Mode," synchronizes an analog sequencer to a MIDI sequencer. MIDI real time messages will send your choice of four trigger pulses to gate outputs 1, 2, 3 and 4: 16th notes, triplets, eighth notes, and quarter notes. Connect the gate output to the Trigger In of an analog sequencer, and you're in business. If your analog machine requires negative-going triggers, you can invert the logic of the trigger pulse. However, the unit does not function as a MIDI-CV interface while in this mode.

The second sub-function allows you to invert the gate logic on all four outputs when playing synths with Moog type gates. If you have a collection of synths, some of which use positive and some negative gate logic, all is not lost. A Roland technician stated that a "qualified technician" could either install gate inverters on the gates as needed, or run a cable from the MPU-101 to an external box containing the negative gates. The cost for parts would be about $5 for each inverter added, but if you go the "qualified technician" route, count on spending at least another $50 for labor and such.

OWNER'S MANUAL

The owner's manual is a 39-page booklet containing a liberal dose of Roland "diagramese" and explanations in fractured English. Although the feature descriptions were sometimes confusing even when explaining simple functions, the operation of the MPU-101 is straightforward enough to prevent any serious problems. The section on advanced setup examples will be useful to those using modular gear with the MPU-101; this part contains a number of easy-to-follow synthesizer block diagrams showing how to create

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such MIDI controlled effects as controlling the mix of two VCOs or a filter envelope with the Dynamics (key velocity) output, and controlling portamento using the Modulation, Aftertouch or Volume outputs. Also mentioned are some alternative applications for the gate outputs, which can trigger various Roland devices such as the Boss HC-2 Hand Clapper and DSD-2 Digital Sampler, or switch the on/off of a chorus such as the Boss CE-300. The gate output can also be connected to a Preset Shift Jack like those found on the Roland SDE-1000/SDE-3000 digital delays and the Roland Juno-106. When using this connection in Poly mode with Assign Mode III, you can step sequentially through a set of presets or alternate between two presets by using some of the techniques mentioned in "Uses And Applications." The MPU-101 brings all these effects under MIDI control. Finally, if you're using a MIDI master controller to trigger something like an analog synth, note that the velocity CV output could be routed to a VCA that controls the synth's overall output to give workable dynamics. Velocity-sensitive minimoogs, anyone?

CONCLUSIONS

While the MPU-101 seems to have been designed with users of modular gear in mind, it's a very useful device for anyone who wants to interface one-Volt-per-octave units with MIDI controllers. In fact, a monophonic guitar-to-MIDI device like the IVL Pitchrider 4000 interfaced with someone's cast off Sequential Pro One via the MPU-101 just might get you into guitar synths for under $1,000. (See Craig Anderton's article in the May '86 **EM** for applications using the IVL 4000.)

My only suggestion to Roland would be to offer a second version of the MPU-101 that replaces the Bender, Modulation, Aftertouch and Volume outputs with a set of Moog gates so you can mix synth types without having to modify the MPU-101. Those particular outputs are wasted when using most hardwired synths, although advanced experimenters will find these invaluable when working with custom CV devices. All things considered, I was very pleased with the MPU-101 and would recommend it highly to anyone who needs a cost effective MIDI-to-CV interface. Here's a very respectful bow to Roland for a useful and well thought-out product. EM

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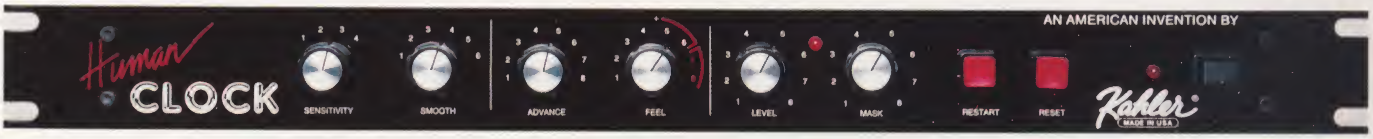
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Additive synthesis can sound breathtaking, but getting good results has always been a tough and thankless job. Fortunately, thanks to the right software, matters are improving.

Softsynth: Additive Synthesis for the Mac

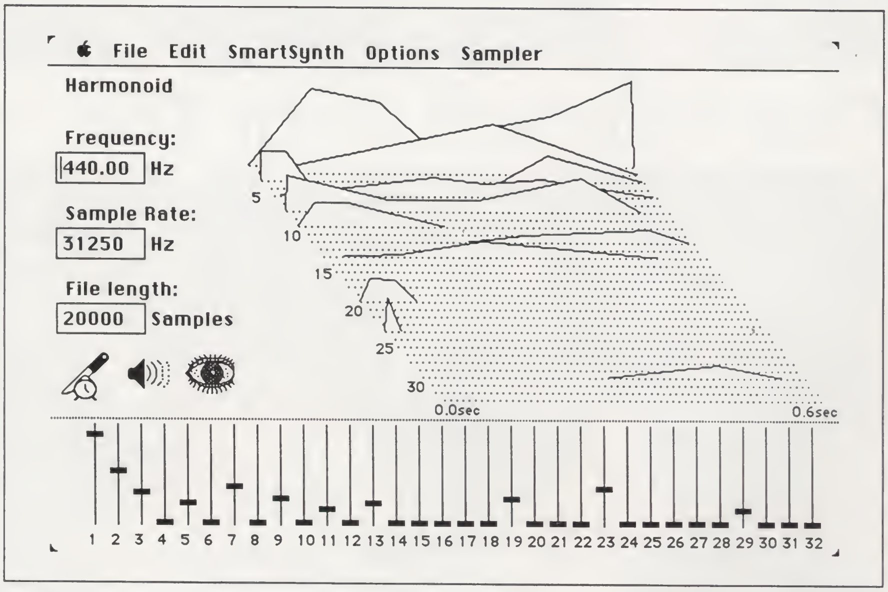
BY GEARY YELTON

Digidesign's Softsynth, from the same wizards who gave us Sound Designer, is an audio power tool that may change the way you think about sound. At $295 retail, just about anyone with a Macintosh and digital sampler can work with truly powerful additive synthesis techniques. Softsynth lets you construct a sound out of raw harmonic elements on the computer screen, then transfer the synthesized sound directly to your sampler.

One copy of Softsynth supports Sequential's Prophet-2000 and 2002, the Ensoniq Mirage and Multisampler, Akai's S900 and S612, Korg DSS-1, E-mu Emulator II (requires Sound Designer as well) and Emax. Digidesign plans Softsynth support for other instruments in the near future. Your Softsynth creations are first saved as parameter files which only Softsynth can read. Before transferring them to a sampler, the program converts these parameter files to 16-bit sound files which can be opened by Sound Designer also. Sound Designer files, on the other hand, cannot be converted to Softsynth parameter files.

SYNTHESIZING WITH SOFTSYNTH

Softsynth can build a sound three different ways: by working with one harmonic at a time, by specifying "harmonic events" within an overall amplitude envelope, or by determining general parameters. Any of these methods can be combined. Essentially, Softsynth is a 32-oscillator digital synthesizer; each oscillator produces one harmonic, and each harmonic has its own complex amplitude envelope and another multistage pitch envelope.



Frequency: 440.00 Hz

Sample Rate: 31250 Hz

File length: 20000 Samples

Fig. 1

Softsynth comes on two disks, one with the application and a system folder, another with some sample parameter files. Upon opening a file, the *main screen*—a three-dimensional representation of the waveform—appears (**Fig. 1**). One horizontal axis represents harmonic number, another plots time in seconds and the vertical axis shows the amplitude of each partial. The envelopes can be viewed from four different angles. Harmonic "faders" adjust the level of each partial, however, the screen isn't updated after changes until you either click on the eye icon (eye-con?) or preview the sound by clicking on the speaker icon.

The *single partial editing mode* screen lets you manipulate individual harmonics. This screen contains two windows: one shows the amplitude envelope and the other shows the tuning contour or pitch envelope (**Fig. 2**). Breakpoints can be inserted into either envelope by grabbing the envelope line with the cursor and repositioning it. Up to 40 breakpoints can be placed anywhere in the amplitude envelope (or removed if desired), and as many as 15 in the tuning contour. The tuning contour can change a partial's pitch up to ±50%.

Each partial's basic pitch is deter-

***Geary Yelton** is a professional musician and part-time writer (his* Rock Synthesizer Manual *was recently revised and expanded). In addition to playing in numerous musical groups, he has composed and recorded electronic music for film and video, and performed one-man synthesizer concerts.*

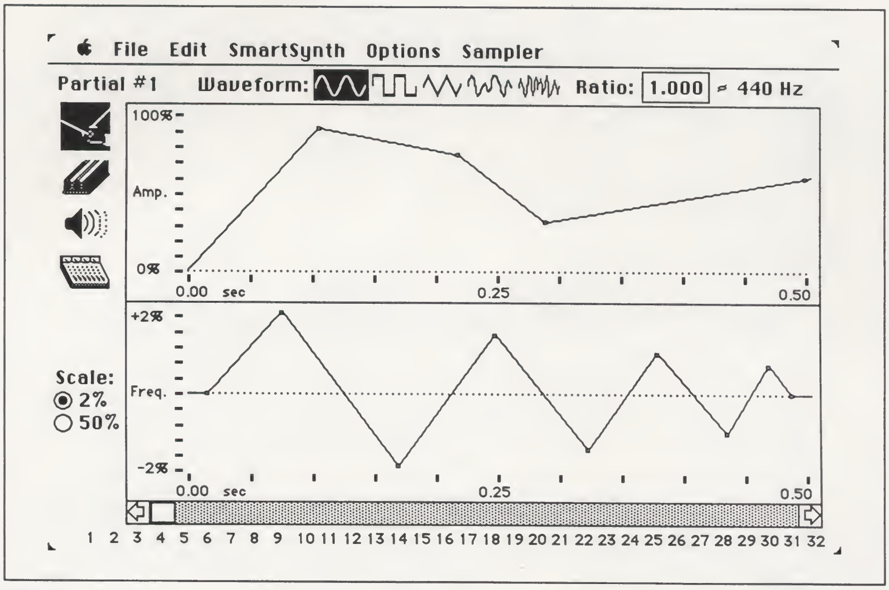


Fig. 2

mined by its ratio to the fundamental frequency. Normally, the second harmonic is twice the pitch of the first (2:1 ratio), the third harmonic ratio is 3:1, and so on. Single partial mode lets you alter the ratio of each harmonic by typing in a new number. Since natural harmonic ratios are seldom perfect multiples, this technique lets you synthesize timbres with a very natural sound compared to most other forms of synthesis. Creating harmonics with nearly identical ratios creates chorusing or detuning effects. In addition, harmonics don't have to be sine waves; you can choose among four other waveforms (square, triangle, bandlimited or tuned noise, and white noise).

You can preview your work through the Mac's speaker at any point in the synthesizing process, however, if you make a change and then preview a complex sound, Softsynth may take a while to recalculate the timbre. A lengthy sound with a lot of harmonic complexity can take as much as a minute to preview; a sound with fewer harmonics can be previewed within seconds. (Perhaps next year's Mac processor will be fast enough for something approaching real time additive synthesis.) Fortunately, any time you make a change in single partial mode, you can hear the results almost (but not quite) immediately.

If painstakingly editing harmonics one at a time seems like a lot of bother, you can copy certain parameters from one partial and paste them to others.

THANKS TO STEVE LEVINE FOR PHOTOGRAPH

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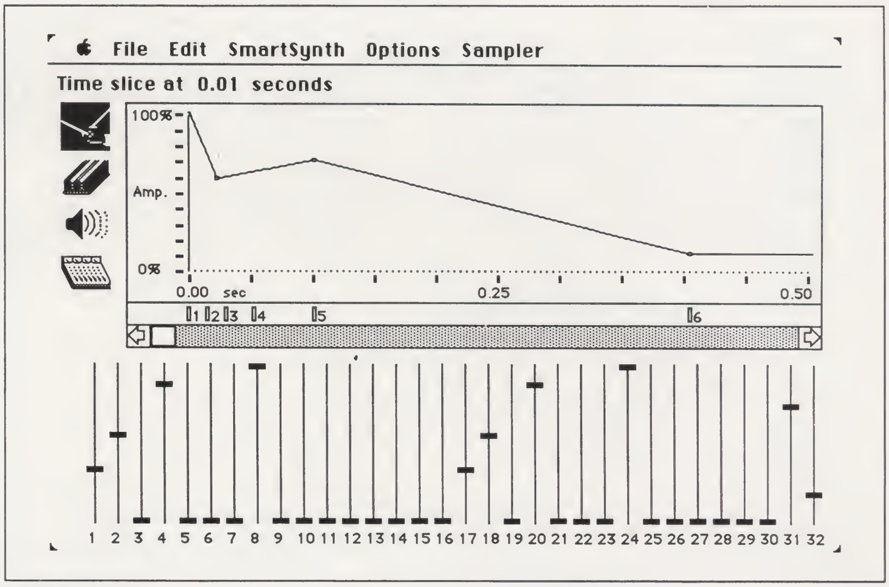
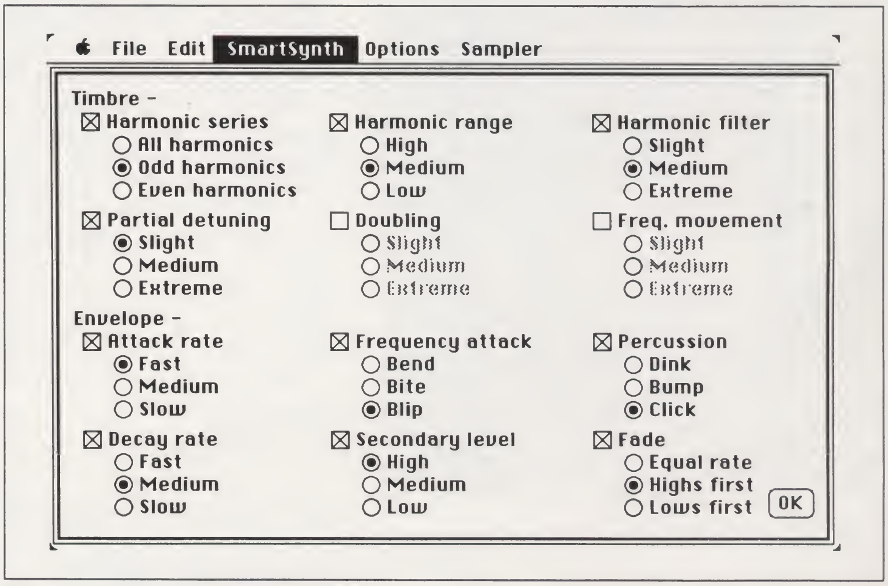


Fig. 3

These parameters include amplitude envelope, harmonic contour, waveform, and harmonic ratio.

If that still sounds like too much trouble, a technique called *time slice editing* comes in handy (**Fig. 3**). In this mode, a single envelope controls a sound's overall amplitude. At any point in this envelope, you can insert "timbre events" (particular combinations of harmonics, as defined with the harmonic faders). Softsynth automatically fades from one timbre event to the next, thus creating dynamic changes in harmonic content—neat! If you go into time slice mode after developing a sound by single partial editing, your efforts are displayed as a time slice display.

For the ultimate in easy additive synthesis, try the *Smartsynth* (intelligent sound generator) function. Selecting "setup" from the Smartsynth menu presents you with a screenful of general parameter descriptions (**Fig. 4**). You can specify the harmonic series and range, the level of lowpass filtering, the amount of detuning and doubling, and several envelope parameters. Each parameter offers three choices. Once you've made your selections, a random number generator chooses parameters within the ranges you've indicated, and calculates a complete parameter file. Select "generate" from the



Timbre -

☒ Harmonic series
○ All harmonics
● Odd harmonics
○ Even harmonics

☒ Harmonic range
○ High
● Medium
○ Low

☒ Harmonic filter
○ Slight
● Medium
○ Extreme

☒ Partial detuning
● Slight
○ Medium
○ Extreme

☐ Doubling
○ Slight
○ Medium
○ Extreme

☐ Freq. movement
○ Slight
○ Medium
○ Extreme

Envelope -

☒ Attack rate
● Fast
○ Medium
○ Slow

☒ Frequency attack
○ Bend
○ Bite
● Blip

☒ Percussion
○ Dink
○ Bump
● Click

☒ Decay rate
○ Fast
● Medium
○ Slow

☒ Secondary level
● High
○ Medium
○ Low

☒ Fade
○ Equal rate
● Highs first
○ Lows first

Fig. 4

main screen, and out pops a new parameter file. If you don't like the result, repeatedly select "generate" until you get something you can use. You can also enter single partial mode and refine the sounds that Smartsynth creates. Smartsynth alone won't teach you much about additive synthesis, but it will provide new sounds you might not otherwise discover.

The complete parameter file is then synthesized into a sound file. Open the file with Sound Designer if you want to process it (e.g. loop, merge with other sounds, and so on); otherwise, just transfer the file directly to your sampler via MIDI. Unlike sampled sounds, there's no chance of aliasing or quantization noise in Softsynth sounds, since nothing is ever actually recorded. You need Sound Designer ($995 list) to use Softsynth with the Emulator II's RS-422 port, but the advantage is that you can transfer sounds at nearly 17 times the speed of MIDI.

IT ALL ADDS UP TO...

As with hardware-based additive synthesizers, single partial editing is still rather tedious, but the ability to copy and paste parameters speeds things up quite a bit. Forty breakpoints in each partial's envelope is probably as many as you'll ever need. There are plenty of harmonics too.

> **"Perhaps next year's Mac processor will be fast enough for something approaching real time additive synthesis"**

Organ timbres and the like are a snap, but effectively replicating most other instrumental sounds requires a rather thorough knowledge of instrumental acoustics. Then again, it never hurts to learn something new about sound, especially if you consider yourself a synthesist. Those with Sound Designer can sample a sound and run a frequency analysis to study the individual envelopes of its harmonics; attempting to duplicate the harmonic content with Softsynth creates a synthetic version of that sound.

The whole point of additive synthesis is gaining complete control over the process of creating a sound. In this respect, Softsynth does its job very well. If controlling every detail isn't for you, the Smartsynth function can supply a limit-

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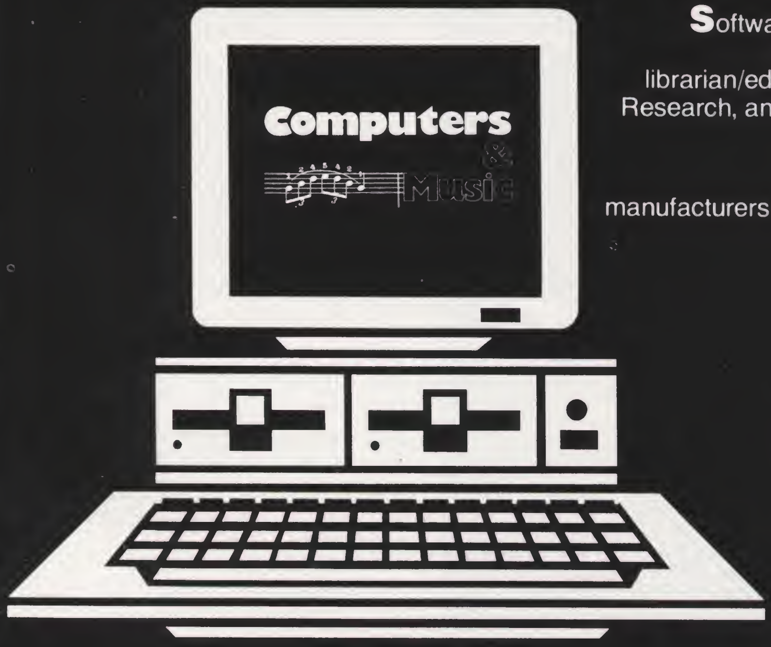

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less palette of new sounds for experimentation. I think Softsynth is significant, not only as a step in the evolution of intuitive, affordable sound synthesis tools, but also as a means of learning more about the nature of sound. It should be a standard fixture in every college-level course on acoustics and every advanced course in electronic music. Unless you're a real whiz at this sort of thing, inventing really useful timbres may take a while. With sufficient skill, though, the results should be worth the effort. Assuming you have a Macintosh, a MIDI adapter, and one of the supported samplers, three hundred bucks is a very reasonable price to pay for such wonderful software. EM

Additive Synthesis Basics

Complex musical sounds can be broken down to their individual harmonics, also called *partials*. An additive synthesizer constructs complex waveforms by combining harmonics at various amplitudes and frequencies. One reason that analog synthesizers have such a "pure" sound is because the harmonics produced by their oscillators are mathematically perfect multiples of one another. The second harmonic is exactly twice the frequency of the first, the third is three times the first, and so on.

However, most acoustical instruments generate overtones that aren't so mathematically precise. Partials may be sharp or flat in relation to the first harmonic (also called the *fundamental frequency*), or their pitches may actually change over a note's duration. The frequency and relative strength of each harmonic also contribute to a sound's complexity and determine its *timbre* (tone quality). At its best, additive synthesis lets you build sounds with all the inherent complexity of acoustical sounds. Many people find additive synthesis to be a great deal more intuitive than, say, FM synthesis. The results are often more predictable as well.

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But we've also considered details that many manufacturers overlooked. For example, the MIDI DJ can handle all 128 notes of each of 16 channels simultaneously. It can save up to 128 sequences or 45,000 notes to a single 5-1/4″ floppy disk. It stores tempo settings. And lets you edit each channel independently.

In fact, the MIDI DJ offers a full range of expanded features that give the musician more control than ever before. Including a fast access Entertain mode to keep you looking good at a live performance.

Add the DJs compact size, attractive design, ease of operation and unbeatable price. Not to mention its unique ability to accept voicing dumps from voice programmable synthesizers. You'll see why the MIDI DJ is rapidly becoming the first choice of professionals everywhere.

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MIDI DJ

We keep hearing that the Amiga is ideal for music. Now, we finally have some software that lets us test that claim.

Mimetics' SoundScape Pro MIDI Studio

BY JEFF BURGER

SoundScape is the first step in Mimetics' plan to turn the Amiga into a complete Desktop Production Studio. It is currently a digital sampler, a sequencer, and general MIDI toolbox. SoundScape files are compatible with Deluxe Music Construction Set from Electronic Arts, so scores can be printed in standard notation. Song pointer and Clock Stop/Start are implemented so that the sequencer, with an existing SMPTE-to-MIDI converter, will chase SMPTE with the Amiga. Mimetics is also working on modules to control lights, video decks, editors, and special effects generators. The future looks like it will allow complete low-cost productions (like your next rock video) to come right out of your bedroom, but even the current tools are very impressive.

To think of SoundScape as just a sampler or sequencer completely misses the point. When I was a kid, one of my favorite toys was the Erector Set. With it you could build anything: a factory, a robot, a rocket launcher—even a factory that built robot rocket launchers if you had enough ambition and parts. SoundScape works that way. It's more like a MIDI Erector Set than anything else. Here's what it offers.

MODULAR MIDI

The Amiga is known for its built-in sound, color graphics, and multi-tasking operating system that allows many programs to run simultaneously in different windows. (In fact, I'm writing this article on my Amiga's word processor while SoundScape runs in the background.) SoundScape is actually a series of individual program modules running concurrently, each doing a specific task and communicating information as MIDI data via an on-screen software Patch Panel. In a way, working with SoundScape is like patching a modular synthesizer, only with a mouse. The beauty of this scheme is that the user can tailor a system to specific needs by using only the modules required for those needs. It's easy to add new modules and update old ones as updates become available.

Product Summary

Product: Mimetics SoundScape Pro MIDI Studio
Type: Sequencer, Sampler and MIDI Toolkit
Price: Pro MIDI Studio Software, $149; MIDI Interface, $49; Sound Sampler Hardware, $99
Hardware requirements: Amiga with 512K minimum
Sequence architecture: Open
Note capacity: Limited only by available memory
Track capacity: Limited only by available memory
Manufacturer: Mimetics Corporation, P.O. Box 60238 Sta. A, Palo Alto, CA 94306; tel. 408/741-0117.

Double-clicking on an icon opens up the control panel window for the respective module. All controls follow the Amiga /Mac/Atari method of point, click and drag.

As of this writing, the *output modules* included in Rev. 1.3 software are Console (QWERTY) Keyboard, MIDI Mixer, MIDI In jack, and MIDI Clock. They can be connected to the inputs of the internal Sound Sampler, MIDI Mixer, MIDI Out jack, MIDI Clock, Tape Deck, and Player Piano. (Use of the MIDI In and Out modules requires an optional interface that connects to the Amiga's RS-232 port and terminates with MIDI In, Out and Thru connections.)

JUST A SAMPLE

The Amiga has four 8-bit companded sampling voices which drive left and right audio outputs. Its filters roll off at 36 dB per octave starting around 4 kHz but Mimetics is working to bypass these filters and get a higher bandwidth.

With no additional hardware SoundScape lets you retrieve samples from disk and play them back. (For user sampling, see below.) While the Amiga can play only four voices at any given moment, SoundScape can address up to 16 voices on separate MIDI channels, each using a different sample of up to 64k in each of ten octaves. This would require more than 512k, but track memory can be expanded to eight megabytes. This allows about 460k of internal memory for samples.

For editing samples, SoundScape provides a visual display of waveforms that shows zero-crossing points for sample start and loop. You can zoom in on any portion of the waveform, grab a pencil with the mouse and edit to your heart's content—even draw a waveform from scratch and loop it into a periodic wave (great fun). Master controls for tuning, velocity, and pitch bend sensitivity as well as a four-stage amplitude envelope are displayed on-screen.

Jeff Burger began composing in electronic music in 1970 and has been programming computers since 1979. His credentials include album, commercial, video and technical writing work. He is currently president of Jeff Burger Creative Technologies, dedicated to all aspects of technology in the arts.

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ROLL YOUR OWN

User sampling is implemented by a small Sound Sampler hardware module which plugs into the second mouse port. User sample controls include record threshold, automatic or fixed record level, and copy to other octaves with and without pitch recalculation. You can control the sampler preamp's output before going to the analog-to-digital converter. The system audibly exaggerates any distorted peaks to make it easier to optimize levels during the sampling process. While the sampler hardware is stereo, only mono is currently supported in software.

INS, OUTS, AND CLOCKS

The Sound Sampler module can be played from several different sources by making the appropriate connection(s) on the Patch Panel. The Console Keyboard module turns the Amiga's QWERTY keyboard into a four-voice MIDI controller that mirrors keystrokes on an onscreen music keyboard. To play the internal voices from a MIDI keyboard, connect the MIDI In icon to the Sound Sampler Module and select an optional channel offset. The Player Piano Module can be patched to other modules to display information flow. It uses another on-screen keyboard that shows input from two selectable channels in two colors.

The Tape Deck, SoundScape's sequencer, will run from the Clock or use MIDI In and Out icons to master (or slave to) an external MIDI clock device such as a drum machine. The Clock window contains tape-deck-style transport controls including Stop, Play, Play from zero, Fast Forward, and Rewind. A master counter displays position in clock pulses and can set, or be set from, two auto-locate registers. Tempo is shown in clocks per second (CPS) or beats per minute (BPM) in the range of 0-250 CPS or 0-625 BPM. As with most MIDI clock-based systems, even though you can increment and decrement tempo by a single clock, this doesn't always calculate out evenly for every BPM (for example, there is no 121 BPM, only 120 and 122).

TRACKOLOGY

The Tape Deck is the most complex module by far, and includes its own clock counter and set of transport buttons. This seemingly odd duplication of controls becomes understandable when you envision extended applications such as synching with free-running external clock devices. The Track List window holds the names and basic status of existing tracks, limited in number and duration only by available memory. Clicking on a track with the mouse highlights it as the current track and displays its attributes in the Track Control Box.

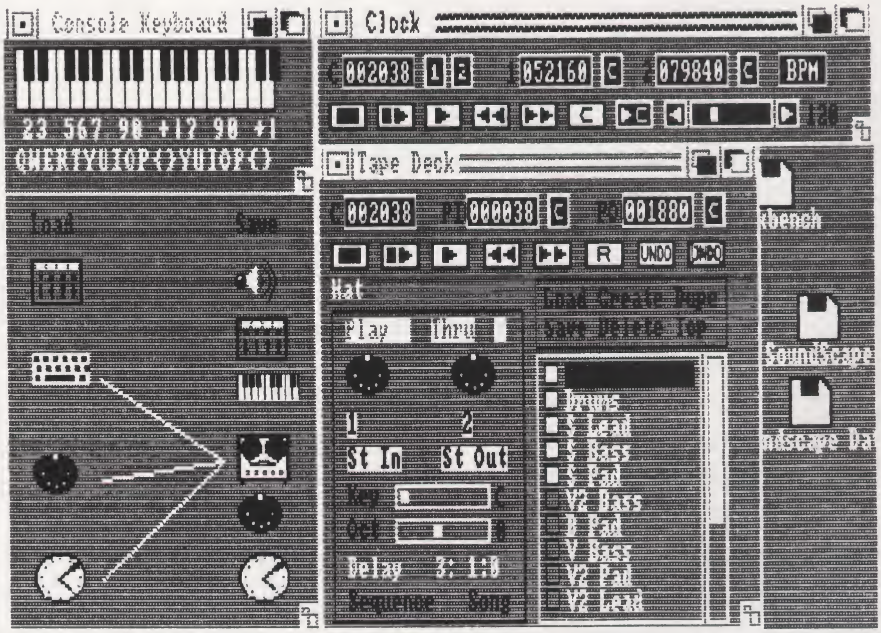

Fig. 1 *SoundScape display with patch panel (lower left) plus tape deck, clock and console keyboard windows open. Note tape deck is receiving signals from console keyboard, MIDI and clock.*

Each track has its own input and output icons which match the ones found on the patch panel. Thus, you might set one track to receive its input from the Console Keyboard and send its output to the Sound Sampler, while other tracks send and receive via the MIDI ports. MIDI input and output channels can be specified separately (1-16), and Status In and Out boxes allow filtering of notes, aftertouch, control change, program change, mono pressure and pitch wheel (default is transceiving note on/off only).

Each track can be transposed individually and set for normal, mute or thru mode. When recording with thru mode on, data received at the MIDI In passes "thru" to the MIDI Out. This is useful if your master keyboard (connected to MIDI In) makes no sound but needs to drive expander modules connected to the MIDI Out. If the master keyboard also includes sound generators, and connects to both the MIDI In and Out, thru would be off to keep the keyboard from feeding back on itself. Each track can also be set for Record or Play mode in addition to a variety of special effect modes. Multiple tracks can be recorded simultaneously and receive different channels (MIDI jam session, anyone?), however the data from a given channel can only be received on one track at a time. Bouncing tracks involves routing outputs to the MIDI Mixer module while recording a new track with the Mixer as its source.

WHERE'S THE BEAT?

SoundScape can load and save any level of information—samples, tracks, songs and environments (i.e., everything in memory). The metronome environment loads a clave sample into the first internal voice along with a series of tracks labeled met24, met48 and met96. Not everyone is happy with MIDI's 24 clocks per quarter-note resolution and SoundScape comes with metronomes that change the way we relate to that resolution. When using met48, for example, the metronome clicks half as often and the clock must be set to 240 BPM to actually get 120 BPM. (Of course, you could set your own bizarre metronome sounds and timings if you like.) I quickly found the need for higher resolutions when my best Hammer-esque leads came back at met24 sounding like our cat was at the pitch wheel. If you remember to think modularly, you come

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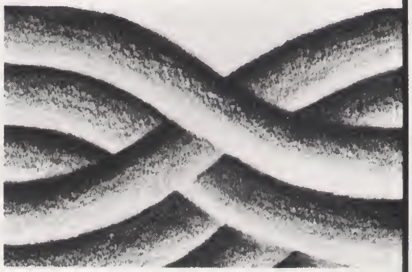

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up with more tricks . . . for example, automatic tempo changes are possible by recording a control track with Clock as input, varying the tempo, and then routing the track's output to Clock In on playback.

RECORDING AND COMPOSING

Since there is no formal count-off or track length, you just start and stop recording where you like. The track's Delay Factor display shows the actual clock pulse of your first note and this can easily be reset to zero (or any other number for a track shift). Punch in and punch out registers provide automatic punching, and the Record button is always "live" for manual corrections. Quantization can be invoked after a track is recorded; the user sets resolution in clock pulses.

> **"To think of SoundScape as just a sampler or sequencer completely misses the point"**

The *Edit List,* which provides for step-editing and data input, displays each event of the current track by clock pulse, classification, value, velocity, next event, time until next event, and duration (as opposed to separate note-on and note-off events). All these parameters are editable and the display can also be toggled from clock pulses to Measures:Beats: Clocks in a user-specified time-signature. Connecting the Console Keyboard to the Tape Deck lets you define the function keys to enter given numbers of clock pulses that match up to rhythmic values of your choice, and the cursor keys double for some of the transport functions.

List Store provides a way to block-manipulate tracks. You can think of it as a series of hooks on which a music editor would hang sections of tape that had been duplicated from the original. It's fairly simple to "hang" a section of a track on one of these "hooks," then attach it to an event's Next pointer somewhere else

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as quick as programs that are totally oriented towards the song/section approach, SoundScape's architecture is infinitely more flexible. For example, it's no problem to have an A-B-C-type song structure using linked tracks while an unbroken melody or orchestration soars across the seams of these sections.

THE BIG PICTURE

Sequencing and sampling are only the tips of Mimetics' artistic iceberg. First, the *special effects* track modes greatly extend the system's uses. *Match* mode plays a track one note at a time and waits for you to match it on a MIDI controller before continuing, which makes this a great educational tool for scales, songs, and more. The Player Piano module could even show the "teacher" track's output and the keys you press onscreen in two different colors! In *Echo* mode, every time a track sees a note on its input channel and device (a keyboard or control track, for instance), a new copy of the sequence begins playing, transposed by the input's relation to Middle C. In *Trigger* mode, a track triggers and retriggers (without transposition) when given a specific note. Finally, *Transpose* mode allows a guide track or controller to change the transposition of other designated tracks. All of these modes hint at a world of applications ranging from education to avant-garde performance.

> **"A good deal of study is necessary to get the most from SoundScape, and dealing with concepts like patching and clock pulses may seem tedious. But the flexibility of the system is incredible"**

Mimetics has hardware in the works to implement tape and drum sync, SMPTE tracking, and multiple MIDI ports. Also a disk is coming out shortly with additional modules and such goodies as a mouse-to-MIDI converter, input splitter, clock multiplier, counterpoint generator, patch

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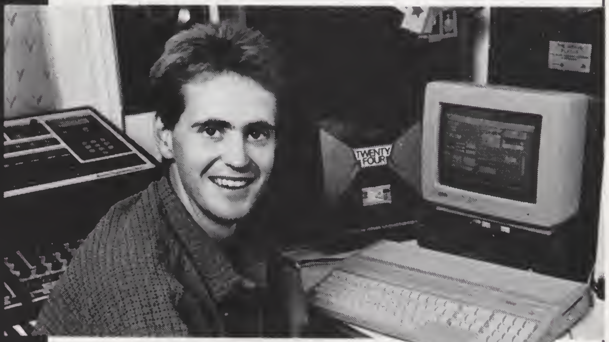

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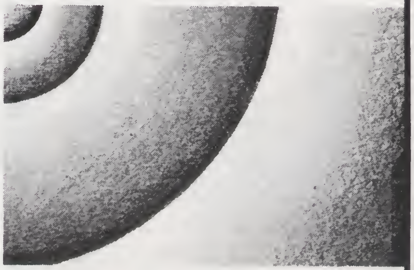

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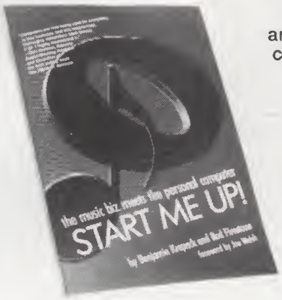
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librarians, and other widgets to add to the Patch Panel. Mimetics even offers a Developer's Kit that gives you all the tools necessary to develop your own modules using the existing modules and protocols. If you don't like the way the editor works or you want to give the world a great new artistic or educational tool, the door is wide open for new applications.

THE VERDICT

My first reaction to using SoundScape was frustration, because the original owner's manual doesn't prepare you for how to think about the system. I was thinking two-dimensionally about a multi-dimensional environment, but after working with the program and speaking to the people at Mimetics, I see way beyond sequencing and sampling into an exciting multi-media future. A good deal of study is necessary to get the most from SoundScape, and dealing with concepts like patching and clock pulses may seem tedious. But the flexibility of the system is incredible and every revision gets friendlier. Of course there are a few bugs here and there but Mimetics seems sincere about continued refinement and input from users on all levels. For both the novice with nothing more than the computer as well as for the pro with a stack of the latest MIDI gear, SoundScape succeeds in tapping the Amiga's power—at a remarkably low price. EM

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PAID NEWSLETTER FROM AXXESS UNLIMITED

The MAP Light

Issue Number 2 Axxess Unlimited, Inc. February, 1987

"Map 'til you drap"

Midi mapping? Glad you asked. It's a way to smoothly integrate and control complex midi setups. Want to know more?

At Axxess Unlimited, we've been happily immersed in midi mapping longer than anyone. Those of you who own the Mapper know that the long intensive development has been worth it. Stay tuned for a quick overview, some questions answered, and some goodies.

Overview

by Jamie Krutz

If you have more than two synths, it's important to know all the ways the Mapper can integrate your equipment. Here are two things you may have missed in the manual.

Mixer Mode You already know that Mixer mode allows you to select patches on remote synths from your master keyboard, solo any channel, and send midi volume for any channel with your mod wheel. But don't forget that you can adjust these volumes while listening to the overall mix, and that the Mapper will continually follow your changes. When you are satisfied with the mix, hit the SUB button on the Mapper to take a "snap-shot" of your volumes and patches and add it to your START command automatically.

Cross Modulation You already know that you can have many controls each affecting many other controls. But did you know they can all control the same parameter at the same time? A simple example would be to use after-touch to drive a system exclusive and midi volume, and the pitch wheel for volume and pitch. Both are affecting midi volume. These subtle volume changes add a lot to the expressiveness of the sound. Now, by controlling the volume using "RELATIVE" mode, both after-touch and pitch wheel adjust the volume from where the other left it.

Questions answered

Axxess staff

Apparently, we have started quite a movement by allowing unlimited split points on all 16 channels. Here are some related questions and answers:

Question: "Do complicated splits slow down the Mapper in any way?"
Answer: No.

Question: "When I use a layer that has 12 synths running, I begin to hear midi delay. What can I do?"
Answer: If some of the synths are playing the same splits, add a START command to knock those channels into omni mode, and group them on one Mapper output. Then transmit just one channel on that output. Make sure the STOP command puts everything back into poly mode. If that's not possible in your situation, try splitting your synths evenly between Out1 and Out 2, or placing sounds with fast attacks on channels 7, 8, 15, and 16. These receive midi commands last from the Mapper.

Question: "What is the most innovative uses of splits you've found so far?"
Answer: If you have lots of synths, try picking a slight variation of the same type of instrument on each. Use 5 different brasses and 5 different strings, for example. Then randomly assign a different brass and string to each key (you have 25 different combinations to choose from), making each note its own split. You won't believe your ears!

Organizing midi

by Brian Parsonnet

According to midi, the mod-wheel, foot wheels, data entry sliders, and some switches are all "control changes." But the pitch wheel sends a completely different type of data. So does after-touch. That means that the sustain pedal is more similar in midi to the mod wheel than pitch wheel is to the mod-wheel.

The Mapper groups all the wheels, modulators, breath, sliders, after-touch, and ribbons together into one bucket.

All switches are grouped together. This includes the sustain pedal, YES / NO buttons, and channel mode messages like omni on/off. Normally, these are all different classes of data.

These groupings make the musician to equipment transition go a lot smoother. Things are grouped logically, rather than technically. What we have done is a little unconventional, but easy to use. In fact, the only thing users do notice is that the Mapper makes a lot of sense.

Goodies

Fast Solo Changes

Here's an idea for the keyboard player who must make fast changes for a solo. Find a switch you're not using on your master keyboard, like a portamento pedal or a low keyboard note. Program the switch to first send back to the master keyboard a command that counters itself, as in "No, I really don't want portamento! I want this...". The switch redefinition should be followed by a list of commands, such as patch changes, volume changes, and effects changes. Program another switch, such as lifting your foot off the pedal, to put everything back to where it was.

Automatic sustain pedal

Here's a quicky. Program the sustain pedal to be released and then held by all note-on events. Every time you hit a chord or a single note, it will hold automatically until you play the next chord or note. Then that one will hold. Don't forget to put a "sustain pedal off" command into the map's STOP command.

If you have questions or would like to contribute your ideas to "the Map Light", please write Axxess Unlimited, Inc., PO Box 8435, Ft. Collins, CO 80525.

The price of automated mixdown is falling rapidly as computer-controlled retrofits for existing consoles start to appear. But can these low-cost automation systems really do the job?

A-kia XZ100

BY CRAIG ANDERTON

Several systems are now available that retrofit an existing mixer to automated mixdown. They usually involve a hardware interface that controls audio levels, and a computer that remembers your mixing moves and feeds appropriate data to the interface. Automating and saving mixes to disk are great functions, but if your main interest is to touch up a mix at a later date, remember that a mix involves much more than automated levels or even automated effects sends (both of which the XZ100 handles); you also need to duplicate your panning, equalization, and outboard effects settings. What automation shines at is controlling complex mixing moves. No longer will you blow a mix by forgetting to mute a bad note, and composers can now compose the *mix itself* as well as the basic tracks.

SYSTEM REQUIREMENTS

The XZ100 system consists of the Recording Studio Computer (RSC), a box with 16 gain control channels each with an RCA phono input and output jack. Typically these connect between the tape recorder outputs and mixer inputs, or insert into the patch bay's send/receive loop jacks. A system can use up to eight RSCs, and can theoretically automate 128 channels. In practice, however, the system is optimized for 32 channel mixdown; two RSCs are used for mixing and additional pairs of RSCs automate effects sends. The XZ100 can automate up to three sends per channel for up to 32 channels. Each RSC lists for $1,499.

Product Summary

Product: XZ100 Recording Studio Computer
Type: Automated mixdown retrofit for existing mixers
List Price: $1,499 for 16-channel hardware interface; $300 for computer interface and software
System requirements: Commodore-64 computer, disk drive, monitor or TV, MIDI Thru box if using multiple hardware interfaces, cables
Storage: 12,000 mixing moves, storable on disk
Synchronization: Initial sync tone starts computer's internal counter; MIDI Song Pointer projected for next software release
Manufacturer: A-kia Electronics, 16740 S.W. 301 St., Homestead, FL 33030; tel. 305/245-2727 or call toll-free 800/225-3675.

Believing it better to dedicate an inexpensive computer to this application than to tie up a costly machine, A-kia includes an interface with the XZ100 that connects a C-64 computer to the RSC via a MIDI cable. A MIDI Thru box is required to drive multiple RSCs. Finally, there's a software disk that you load into the C-64's disk drive. The interface and disk cost $300. No cables are included as part of the package.

The system's most negative aspect is the packaging. The RSC is not rack-mounted and frankly, it looks a bit like a high-tech sprinkler system. Hook it up to the somewhat cheezy-looking C-64, and you have a system that might seem out of place in a high-class studio. And of course, with the C-64 you have the usual maze of cables, interface, adapters, disk drive connectors, etc., so this is anything but a tidy package. But don't let that turn you off—the XZ100 delivers what it promises.

BASIC AUTOMATION

Upon booting the program, you have a choice between *practice* (for learning the system), *mix with multi-track recorder*, and *status maker*. The last is a special function we'll cover later.

If you select "practice" or "mix," the screen shows a display of 32 faders, each set to the midpoint of the screen. The RSC defaults to zero gain, and can attenuate or amplify. Concerning sound quality, the RSC is exceptional—even transparent. When asked to account for the sound quality, Odded Zamir, A-kia's president, said that they are not using VCAs, or for that matter, off-the-shelf parts.

Unfortunately, in the first models you had to program one channel at a time; there was no way to jump from channel to channel without going back to the main menu. Thankfully, this has now been remedied (check with A-kia for details on how to obtain the revised software). Levels are set from the lower three rows of the Commodore keyboard; to increase level, for example, you would start with the Q key then press A, Z, W, S, X, E, D, C, R, F, V, and so on. This order seems arbitrary but makes complete sense when you're sitting at a QWERTY keyboard. The Shift key can also be used to "fine-tune" the level, so a total of 62 level increments are available over the unit's 100 dB range.

***Craig Anderton**'s recent work as a mix/production consultant can be heard on the Narada/MCA albums* Emerald *(by Brewer/Tingstad/Rumbel) and* Ancient Legend *(by David Arkenstone; due for March release). He is currently working on* Eden, *a duet album with pianist Spencer Brewer.*

Using the C-64 keyboard is less clunky than you might think, although it does take a little while to get used to. In fact it has some advantages over using a fader. For one, the settings are very easily repeatable; for another, stepping through volume changes by popping the QWERTY keys on the beat (instead of by the usual continuous fader slide) adds a nice rhythmic feel to my dynamics changes. For those who prefer faders, A-kia plans to market an eight-fader interface which can be assigned to any group of eight channels (1-8, 9-16, etc.).

Hitting the space bar mutes the chosen channel, and hitting * restores the level to where it was prior to muting. The computer stores each level-changing keystroke as a "move" and the XZ100 can memorize up to 12,000 moves (for example, with a six minute song you could have a level change every second on all 32 tracks).

> **"Although programming each track (to perfection) takes time, this is offset by the time you save by not blowing takes during final mixdown"**

Overall, the editing and updating capabilities are superb. Moves can be treated as overdubs (i.e. new moves are *added* to any existing moves) or, if you first press the Inst/Del key, new moves will *overwrite* existing moves. You can exit the overwrite mode at any time to get back to overdubbing or to leave existing moves as is. Moves can also be deleted in step time. In both record and playback modes, the screen displays a set of moving faders that graphically represents all the fader changes you've made. Moves can be copied from one track to another and any number of tracks can be grouped at any time so that you can automate, for example, a pair of stereo tracks simultaneously. This kind of editing flexibility makes it easy to "tweak" a track to perfection. Although programming each track takes time, this can be offset by the time you save by not blowing takes during final mixdown. However, there is no track invert function for easy panning, nor a scaling function to make an overall level change, as included with some other systems.

By the way, A-kia's ads claim that the system provides up to 128 compressor/limiters and noise gates, but all this means is that you can gate signals using the mute/unmute function, and give the effect of compression/limiting by programming a lower level on peaks and a higher level on valleys. Thus, the "gating" and "compression" are not as sophisticated or easy to use as with dedicated outboard units.

SYNCHRONIZATION

There are two synchronization methods. The first is crude, but has indeed worked for me so far; it involves recording a tone burst at the beginning of the tune, and on playback, this tone starts the XZ100's internal counter. Assuming that the counter and tape recorder speeds don't drift, synchronization is maintained between the two. However, this precludes varying the multi-track speed during mixdown. So far, this method of synchronization has worked just fine, but just before press time, MIDI Song Pointer was implemented to allow sync to SMPTE—a necessity for professional applications. Still, one very nice advantage of the present system is that you need not sacrifice an entire track for sync. As a result, 4- and 8-track studios may prefer to ignore the MIDI Song Pointer feature anyway.

You need not always take a song from the top when doing a mix. You can record another sync tone, and if you play back the tape from the beginning, the XZ100 will remember the location of the second sync tone. You can then repeatedly go over the section starting with the second sync tone. You can repeat this process as many times as desired in as many different parts of the song as required, and the XZ100 will automatically integrate these moves into the song as a whole—quite remarkable. You do, however, need to find a clear space on the tape to record the tone that triggers the

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XZ100, and there must be sufficient blank tape before the tone so that triggering doesn't occur on some other sharp-attack sound.

STATUS MAKER

This is one of the best parts of the program. When using Status Maker, you start at the beginning of a song, set the levels as desired, and store this "snapshot" of level settings as a "status." You then move on to the next part of the tune that requires a different status, set the levels, and store the new status. As you proceed through the song, you can keep storing status settings but note that as yet, these are not synchronized to anything. Once you have stored all your statuses, you then play the song, sync the XZ100 to the beginning-of-song tone reference, and press the up arrow key where the first status is to take effect. As the song continues, pressing the up arrow key where you want each subsequent status to occur fixes the temporal location in memory with respect to the initial sync tone.

But that's not all. Statuses can be inserted, deleted, or modified. Most importantly, it is possible to go back to the main menu, load a set of statuses, and edit mixes using all the normal overdub, delete, and edit functions. So, typically you will make up your statuses with status maker, then go into the main program and add the required moves between statuses (i.e., muting and level changes) using the XZ100's standard editing techniques.

FINAL MIX

The XZ100 is easy to learn and use; the sound quality is all you could ask for; and it's relatively open-ended. I kept thinking there must be a catch—like maybe if you're creating dozens of moves simultaneously on all 32 channels you'll hear a delay or something—but so far the system has performed flawlessly. Best of all, it has enabled me to work on a mix until it too is flawless. To a small studio owner such as myself, that's real progress.

Since I was working on a project that necessitated automated mixdown, after playing with the XZ100 for a while I was impressed enough that I offered to buy it. Mr. Zamir offered instead that I pay him with my time and help revise the XZ100 manual. I knew a deal when I saw one, so if you see my name on the manual, that's the story . . . and now I have automated mixdown. It sure is fun!

—continued from p. 50, TAPE

twice as fast at 30 ips.

So how do you decide, then, whether to go for the more songs but thinner tape and/or lower speed, or to fork over the cash for two reels with the extra thickness and/or higher speed?

For the thickness question, ask yourself the following questions. Are you, regardless of your musical style, a "capture-the-moment" artist/band or an "I swear I can do it better this time" performer? Will there be few overdubs or many? The point is that thicker tape will take the dozens of changes in direction needed for many takes—recording, rewinding, re-taking, rewinding, etc.—better than thinner tape.

Do you, in your activities in general, act quickly and move on, or often reconsider and take time to perfect what you do? That is, will your recording projects be quick, one-shot affairs or will the multitrack master sit on the shelf for awhile before you go back to it for revision? Thicker tape will resist print-through longer, but in one-shot projects, thinner tape wil cut costs.

Have you, over the last few years, found your musical sensibility changing a lot, and how do you feel about that? If you hate everything you wrote more than six months ago and tend to take that stance in general, then there's very little chance you'll want to unearth and add to a tape in five years. On the other hand, if you work the same musical vein for a decade at a time, you may well want to dig out old things to replace and overdub. If that's the case, remember that thicker tape curls less and is stored straighter. Since it's stacked in fewer tight circles, especially on the inner reels, it tends to sashay less and resist unwinding less after long periods in storage. The difference can be significant.

In regards to the speed issue, there are two central questions: how much fidelity do you need, and how much noise can be present in your music? Remember, higher speed renders more fidelity and less tape noise; lower speed gives you more time per reel.

Finally, if this project is likely to be copied through several generations—if it is likely to go to vinyl, for example—protect yourself against generational degeneration and use the highest speed and the thickest tape.

There's the basic take on tape. Use it and enjoy it.

—continued from page 55, MIDI

As for your performance, higher-level sequencers let you edit a piece note-by-note, including parameters such as velocity. The point is, you are not stuck with your performance as you are with tape. Nor is it necessary to do endless takes to get it right; you can edit a mediocre performance into perfection if you're willing to take the time to do it.

12. *All sync codes are the same.*

Not true. The old FSK standard has four different clock speeds: 24 (Sequential, Roland, MXR), 48 (Linn, Simmons), 96 (Oberheim, new Roland FSK), 120 (Texture/IBM). In addition, SMPTE time code is now in widespread use; among other talents, SMPTE code allows auto-location between tape recorders and MIDI sequencers.

13. *You can have only one master at a time.*

In several situations you may need more than one master. When synching to tape with a SMPTE box such as the Roland SBX80, the SBX80 is the master and your sequencer is the slave. Since the sequencer is driving your synths at the same time, the sequencer is a master with respect to the synths but a slave with respect to the SBX80.

Another use of double masters is when you are using software such as Southworth's *Total Music* for the Macintosh; there are two MIDI In jacks, which allows two players to play into the sequencer at once. If your sequencer has just one MIDI In jack, you can use mergers from companies such as J.L. Cooper, Harmony Systems, and others to merge the data from two MIDI instruments.

14. *A floppy disk is to MIDI recording as a 24-track tape is to conventional tape recording.*

Again, "tape thinking" doesn't apply here. When recording on a MIDI system, there is generally no need to use separate tape tracks for each synth. The MIDI instruments can be mixed and sent *directly* to the final 2-track master (Beta/VHS Hi-Fi, PCM-F1, reel-to-reel, etc.) without using any intermediary multi-track tape recorders. Thus, there is no loss due to tape generation as there would be recording to, say, your 8-track, and then mixing down to cassette or reel-to-reel. In addition, acoustic instruments (voice, guitars, etc.) can be recorded on multi-track, along with a sync signal to which the MIDI sequencer can synchronize. So, when you walk out of a MIDI studio, you will probably have a multi-track tape with acoustic overdubs and a sync track, a floppy disk with your sequences on it, a backup floppy, and your final mixed 2-track. There is no one master.

15. *MIDI is difficult to learn.*

All it takes is practice. In fact, it takes a lot less practice than learning to play guitar or keyboards! If you don't know where to start, then jump right in and experiment. You won't blow anything up by pushing the wrong button at the wrong time (and if you can, the manual will tell you).

As you learn more about MIDI, its operation will become second-nature, and this will free you to experiment and create more and better music as time goes on...which is what MIDI is all about in the first place.

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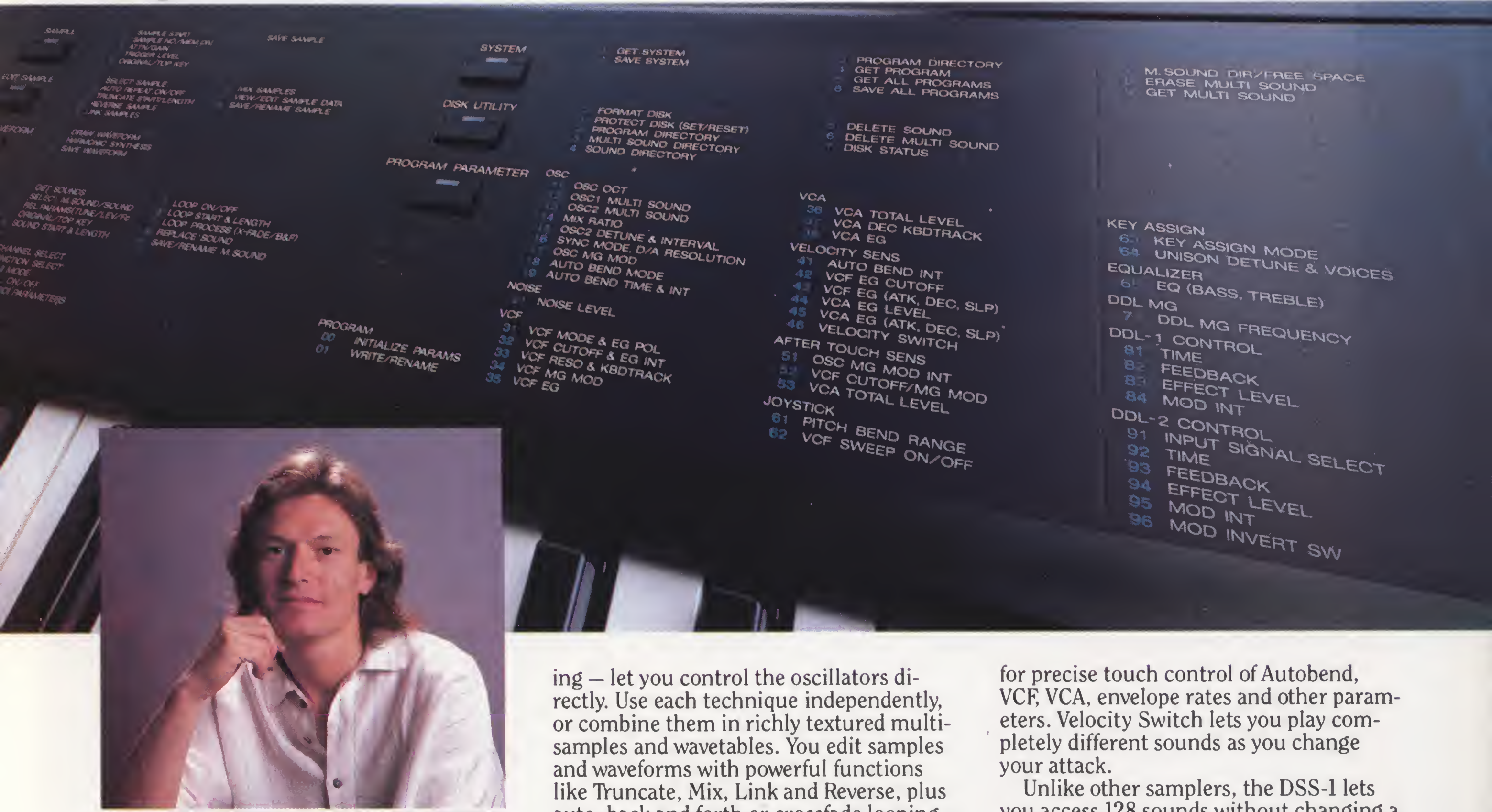
Why should a sampler and a synthesizer be combined? Experimentation.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